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The White Island Sulphur Deposit

SYNOPSIS—White Island, on the coast of New Zealand, contains unique deposits of sulphur which are being worked. The material occurs both as superficial solid material and as a liquid product of hot springs. The island is apparently a volcanic crater and the sulphur is the result of its thermal activity.

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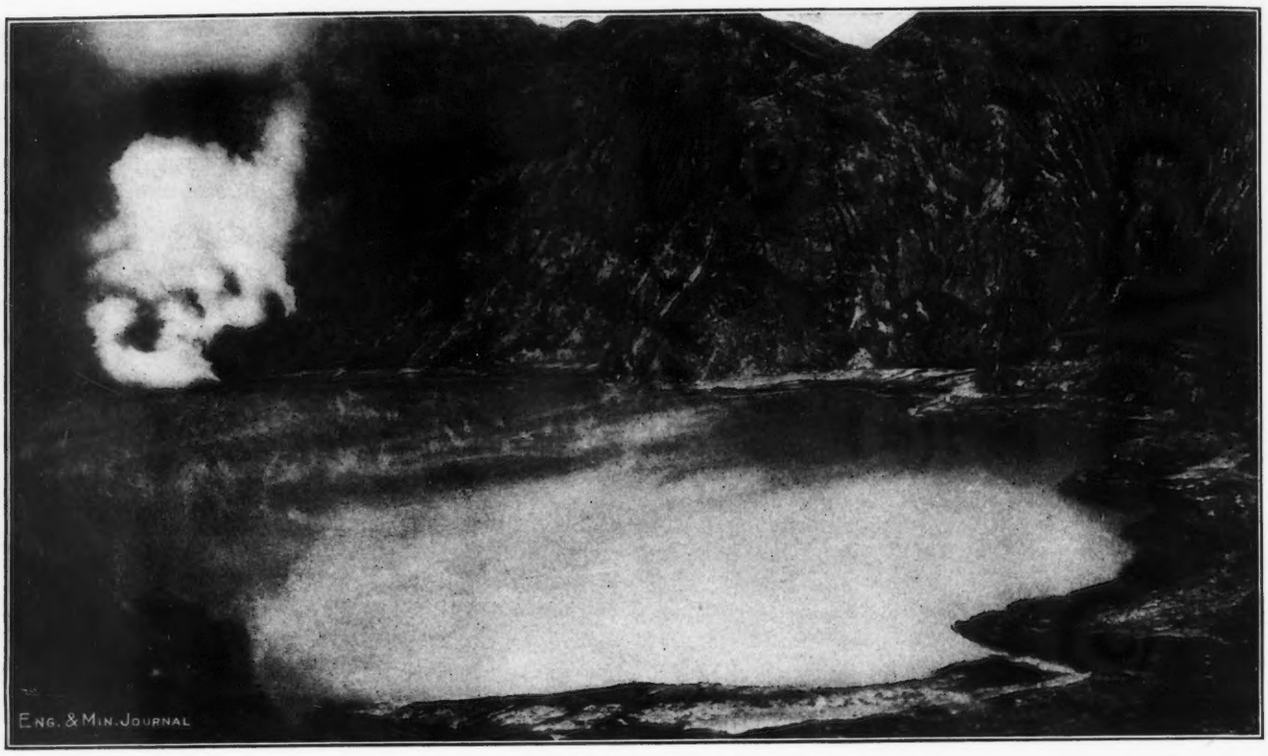
An extremely interesting and apparently valuable deposit of sulphur is being worked on White Island, New Zealand. This is a small island of about 590 acres lying in the Bay of Plenty, on the east coast of the North Island, about 30 miles from the mainland. The island is the scene or the result of volcanic activity and the presence of the sulphur is attributable to this fact. The material occurs in both liquid and solid form of varying degrees of purity, the principal other substance of the admixture being gypsum.

CRATER BAY, SHOWING BUILDINGS IN FOREGROUND

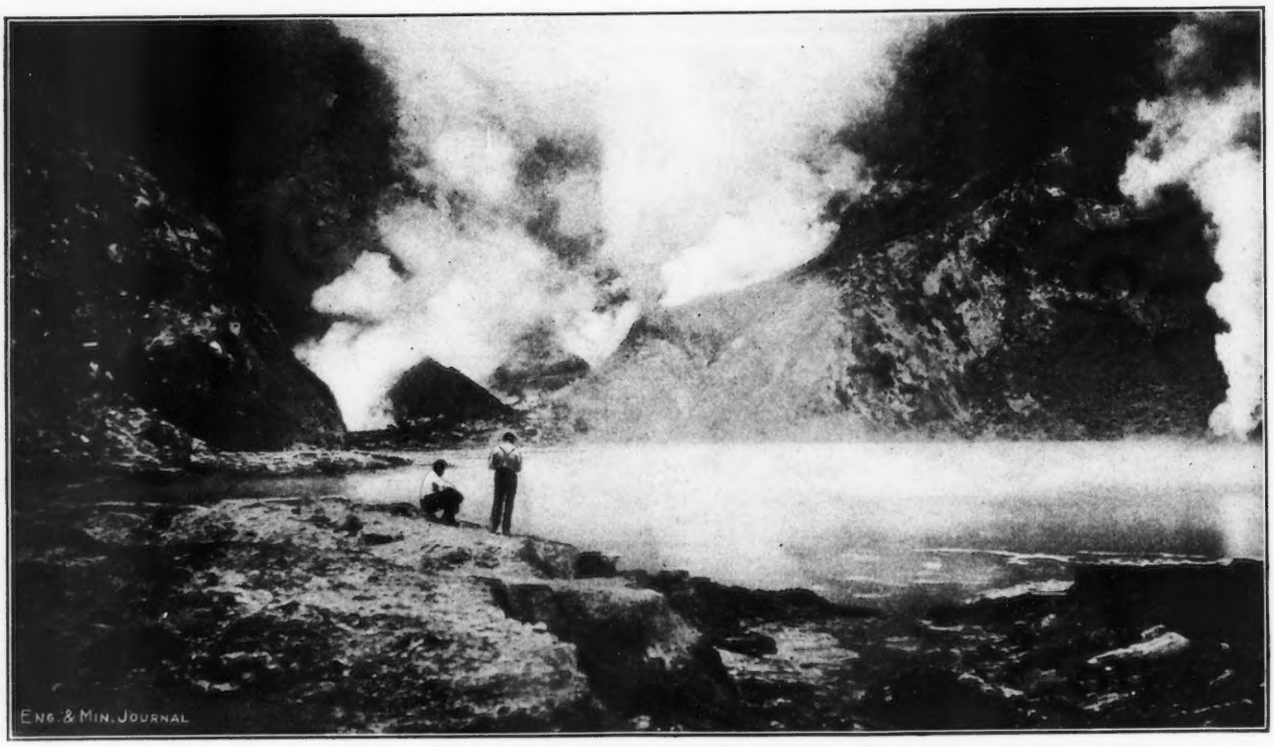
The island itself is in somewhat the shape of a horseshoe in all three dimensions. About 150 to 200 acres are flat and a part of this area is taken up with a lake. The flat portion opens on the sea on one side, except for a hill in the center of the opening. The rim around the remaining edge of the island attains a height of 900 ft. Topography and thermal activity would indicate that the island is an old crater.

In the flat portion between the lake and the sea, rock sulphur and flowers of sulphur are found; about 6500 tons of this was in such shape as to be readily extracted. A possibly more important source of sulphur is a boiling spring behind the lake, which pours out a continual stream of liquid product. The exact quantity that could be obtained from this source is indeterminable, but estimates give several tons per hour; it is of high-grade, 94% sulphur. The possibility of tapping the underground source of this spring with boreholes and pumping the sulphur is an attractive one. Sulphur also exists in the lake bottom, which has been drained in successive cuts so as to uncover a large deposit of nearly pure material.

There was on the dumps at last report about 4000 tons of material running from 60 to 70% sulphur, and 700 or 800 tons of pure sulphur which needs practically no refining. The operating company has put up a number of sheet-iron houses, as can be seen from the illustration, and has laid track for handling the material mined. Additional equipment includes trucks, concrete water tanks and a winch. Refining is carried on in a battery of three retorts, each capable of handling about four tons per hour. These were built by the Macauley Foundry Co., of West Berkeley, Calif. The process is simple, the material being wheeled from dump to retorts, and the sulphur melted out by the introduction of superheated steam. The liquid sulphur runs out into troughs and the comb



THE LAKE. STEAM JET ON LEFT



THE HEAD OF THE LAKE, PARTLY DRAINED. THE STEAM JET ON THE RIGHT MARKS THE SULPHUR SPRING

of gypsum remaining is transferred to another dump. It is hoped to dispose of the gypsum later at a profit, in the New Zealand market.

The lake is of a vivid green color and is stated to be highly acidulated with both sulphuric and hydrochloric acids. It is stated that the water has been reputed to have curative properties and has been freely taken away by tourists. The level of the lake, until it was drained, used to vary considerably, and its area correspondingly, the latter being variously given at 15 and 40 acres. Around the lake, principally on the side against the hills, there are steam blow-holes which make a roar that can be heard for miles. The cloud from these jets, hanging over the island, gave it its name. It is stated that the steam jets spring from cones of bright-colored sulphur.

The island has been known to tourists as a curiosity

for a good many years. Even as long ago as 1885, Judge Wilson, who owned the property, attempted to exploit the sulphur and even shipped 600 or 700 tons of pure material to Sydney. After his death, the island was in the hands of his executors for several years and was finally sold to Andrew Gray, of Wellington, who tried unsuccessfully to interest capital in working the deposits. The island was finally purchased in January, 1912, by the White Island Sulphur Co., Ltd., a Canadian concern, after examination by an engineer, Mr. Stockings, who apparently reported favorably on the presence of the sulphur, but considered that the lack of water, the presence of sulphur fumes and the difficulties of landing, would make its working difficult or impossible. These difficulties appear to have been overcome and successful operations begun.

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The New Income Tax

WASHINGTON CORRESPONDENCE

The following summary gives those portions of the income-tax law which have a direct bearing upon the payment of the tax by mining corporations. Some important changes were made by the conference committee in this phase of the law at the last moment, embodying provisions that had not previously become known.

The provision as to allowances for depreciation in the value of mines in making report of net individual income for taxation is interesting and follows the Senate amendment to the income-tax sections. After it has provided for the so called "normal tax" on ordinary incomes the tariff bill allows certain offsets, among which is included the allowance for mine depreciation, in part as follows:

"That in computing net income for the purpose of the normal tax there shall be allowed as deductions: First, the necessary expenses actually paid in carrying on any business; second, all interest paid within the year by a taxable person on indebtedness; third, all national, state, county, school and municipal taxes paid within the year, not including those assessed against local benefits; fourth, losses actually sustained during the year, incurred in trade or arising from fires, storms, or shipwreck, and not compensated for by insurance or otherwise; fifth, debts due to the taxpayer actually ascertained to be worthless and charged off within the year; sixth, a reasonable allowance for the exhaustion, wear and tear of property arising out of its use or employment in the business, not to exceed, in the case of mines, 5% of the gross value at the mine of the output for the year for which the computation is made; but no deduction shall be made for any amount of expense of restoring property or making good the exhaustion thereof for which an allowance is or has been made. Provided, that no deduction shall be allowed for any amount paid out for new buildings, permanent improvements, or betterments, made to increase the value of any property or estate. . . ."

Subsection G of the income-tax provision is practically a reënactment of the corporation tax now in force. The conference committee, however, made important alterations in its terms, leaving it to read in part in the following form:

G. (a) That the normal tax hereinbefore imposed upon individuals likewise shall be levied, assessed, and paid annually upon the entire net income arising or accruing from all sources during the preceding calendar year to every corporation, joint-stock company or association, and every insurance company, organized in the United States, no matter how created or organized, but not including partnerships; but if organized, authorized, or existing under the laws of any foreign country, then upon the amount of net income arising or accruing by it from business transacted and capital invested within the United States during such year.

(b) Such net income shall be ascertained by deducting from the gross amount of the income of such corporation, joint-stock company or association, or insurance company, received within the year from all sources: (1) All the ordinary and necessary expenses paid within the year in the maintenance and operation of its business and properties, including rentals or other payments required to be made as a condition to the continued use or possession of property; (2) all losses actually sustained within the year and not compensated by insurance or otherwise, including a reasonable allowance for depreciation by use, wear and tear of property, if any; and in the case of mines a reasonable allowance for depletion of ores and all other natural deposits, not to exceed 5% of the gross value at the mine of the output for the year for which the computation is made. (3) Provided, that in case of indebtedness wholly secured by collateral the subject of sale in ordinary business of such corporation, joint-stock company, or association, the total interest secured and paid by such company, corporation, or association within the year on any such indebtedness may be deducted as a part of its expense of doing business; Provided further, that in the case of bond or other indebtedness, which have been issued with a guaranty that the interest payable thereon shall be free from taxation, no deduction for the payment of the tax herein imposed shall be allowed. (4) All sums paid by it within the year for taxes imposed under the authority of the United States or of any state or territory thereof, or imposed by the government of any foreign country: Provided, that in the case of a corporation, joint-stock company, or association, organized, authorized, or existing under the laws of any foreign country, such net income shall be ascertained by deducting from the gross amount of its income accrued within the year from business transacted and capital invested within the United States, (1) all the ordinary and necessary expenses actually paid within the year out of earnings in the maintenance and operation of its business, and property within the United States, including rentals or other payments required to be made as a condition to the continued use or possession of property; (2) all losses actually sustained within the year in business conducted by it within the United States and not compensated by insurance or otherwise, including a reasonable allowance for depreciation by use, wear and tear of property, if any, and in the case of mines a reasonable allowance for depletion of ores and all other natural deposits, not to exceed 5% of the gross value at the mine of the output for the year for which the computation is made; and in case of insurance companies the net addition, if any, required by law to be made within the year to reserve funds and the sums other than dividends paid within the year on policy and annuity contracts.

(c) The tax herein imposed shall be computed upon its entire net income accruing during each preceding calendar year ended Dec. 31; provided, however, that for

the year ended Dec. 31, 1913, said tax shall be imposed upon its entire net income accruing during that portion of said year from Mar. 1 to Dec. 31, both dates inclusive, to be ascertained by taking five-sixths of its entire net income for said calendar year; provided, further, that any corporation, joint-stock company, or association subject to this tax may designate the last day of any month in the year as the day of the closing of its fiscal year and shall be entitled to have the tax payable by it computed upon the basis of the net income ascertained as herein provided for the year ending on the day so designated in the year preceding the date of assessment instead of upon the basis of the net income for the calendar year preceding the date of assessment; and it shall give notice of the day it has thus designated as the closing of its fiscal year to the collector of the district in which its principal business office is located at any time not less than 30 days prior to the date upon which its annual return shall be filed. All corporations, joint-stock companies or associations subject to the tax herein imposed, computing taxes upon the income of the calendar year, shall, on or before Mar. 1, 1914, and the first day of March in each year thereafter, and all corporations, joint-stock companies, or associations computing taxes upon the income of a fiscal year which it may designate in the manner hereinbefore provided, shall render a like return within 60 days after the close of its said fiscal year, and within 60 days after the close of its fiscal year in each year thereafter, or in the case of a corporation, joint-stock company, or association, organized or existing under the laws of a foreign country, in the place where its principal business is located within the United States, in such form as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe, shall render a true and accurate return under oath or affirmation of its president, vice-president, or other principal officer, and its treasurer or assistant treasurer, to the collector of internal revenue for the district in which it has its principal place of business, setting forth (1) the total amount of its paid-up capital stock outstanding, or if no capital stock, its capital employed in business, at the close of the year; (2) the total amount of its bonded and other indebtedness at the close of the year; (3) the gross amount of its income, received during such year from all sources, and if organized under the laws of a foreign country the gross amount of its income received within the year from business transacted and capital invested within the United States; (4) the total amount of all its ordinary and necessary expenses paid out of earnings in the maintenance and operation of the business and properties of such corporation, joint-stock company, or association, or insurance company within the year, stating separately all rentals or other payments required to be made as a condition to the continued use or possession of property, and if organized under the laws of a foreign country the amount so paid in the maintenance and operation of its business within the United States; (5) the total amount of all losses actually sustained during the year and not compensated by insurance or otherwise, stating separately any amounts allowed for depreciation of property, and in case of insurance companies the net addition, if any, required by law to be made within the year to reserve funds and the sums other than dividends paid within the year on policy and annuity contracts. . . .

All assessments shall be made and the several corporations, joint-stock companies or associations, and insurance companies shall be notified of the amount for which they are respectively liable on or before the first day of June of each successive year, and said assessment shall be paid on or before the 30th day of June. Provided, however, that every corporation, joint-stock company or association, and insurance company, computing taxes upon the income of the fiscal year which it may designate in the manner hereinbefore provided, shall pay the taxes due under its assessment within 120 days after the date upon which it is required to file its list or return of income for assessment; except in cases of refusal or neglect to make such return, and in cases of false or fraudulent returns, in which cases the Commissioner of Internal Revenue shall, upon the discovery thereof, at any time within three years after said return is due, make a return upon information obtained as provided for in this section or by existing law, and the assessment made by the Commissioner of Internal Revenue thereon shall be paid by such corporation, joint-stock company or association, or insurance company immediately upon notification of the amount of such assessment; and to any sum or sums due and unpaid after the 30th day of June in any year, or after 120 days from the date on which the return of income is required to be made by the taxpayer, and after ten days' notice and demand thereof by the collector, there shall be added the sum of 5% on the amount of tax unpaid and interest at the rate of 1% per month upon said tax from the time the same becomes due.

(d) When the assessment shall be made, as provided in this section, the returns, together with any corrections thereof which may have been made by the commissioner, shall be filed in the office of the Commissioner of Internal Revenue and shall constitute public records and be open to inspection as such. Provided, that any and all such returns shall be open to inspection only upon the order of the President, under rules and regulations to be prescribed by the Secretary of the Treasury and approved by the President. Provided further, that the proper officers of any state imposing a general income tax may, upon the request of the governor thereof, have access to said returns or to an abstract thereof, showing the name and income of each such corporation, joint-stock company, association or insurance company, at such times and in such manner as the Secretary of the Treasury may prescribe.

If any of the corporations, joint-stock companies or associations, or insurance companies aforesaid, shall refuse or neglect to make a return at the time or times hereinbefore specified in each year, or shall render a false or fraudulent return, such corporation, joint-stock company or association, or insurance company shall be liable to a penalty of not exceeding $10,000.

Effect of Foreign Metals on the Rolling of Zinc

Ingots weighing 40 lb. were prepared by E. Prost and A. van de Casteele by casting together zinc alloys of various metals, with spelter containing Pb, 1.05 to 1.25%; Cd, 0.076 to 0.11%; and Fe, 0.03 to 0.039% (*Bull. Soc. Chim. Belge*, p. 175, 1913). The following conclusions are drawn: Cadmium is harmful above

0.25%; with 0.50% rolling is no longer possible. Arsenic, 0.02% markedly increases the hardness, and with 0.03% the metal is too brittle for practical purposes. Antimony is less objectionable than arsenic as regards hardness, as 0.07% does not increase the latter; but 0.02% is sufficient to produce a striated surface on the rolled sheet which makes it unsalable. Tin is objectionable above 0.01, and prohibitive at 0.03%. Copper is without hardening effect until it reaches 0.08, but with 0.19% the zinc is unworkable. Iron, 0.12% is a permissible maximum, but this is easily reduced in refining. Lead, though 1 to 1.25% does not interfere with the rolling, a slight increase not only seriously affects malleability but the excess of lead remains unalloyed and forms patches on the sheet. The presence of two or more impurities together results in a combination of the injurious effects of each.

Butte & Superior

The Butte & Superior company is now producing about 10,000 tons of blende concentrate per month and about 350 tons of galena concentrate. The former goes about 50% zinc and 20 to 25 oz. silver per ton; the latter about 35% lead. The lead concentrate is a small but not unimportant byproduct.

THE BUTTE & SUPERIOR MILL, BUTTE, MONT.

The zinc concentrate goes chiefly to smelters in Oklahoma on a sliding-scale contract, based on the price for spelter. The residuum remaining after extraction of the zinc is returned to the company for realization of its silver value. This involves sending the residuum to silver-lead smelters and the ultimate recovery of silver in proportion to the content of the raw concentrates is small, while freight and smelting charges are high. It was the hope of doing better in this matter that was the inspiration of the electric smelting experiments that were made at Butte, but they were unsuccessful.

In the milling process employed at Butte as much of the blende as is possible is taken out on the jigs and tables, the proportion of concentrate secured in this way being about 6000 tons per month, assaying nearly 52% zinc. This is relatively coarse material, and is a desirable product from the standpoint of the zinc smelter.

The middlings from the jigs and tables, assaying about 20% zinc, or about the same as the original ore, are reground and submitted to the flotation process, which makes about 4000 tons monthly of concentrate going about 48% zinc. This concentrate is very fine, all of it going through an 80-mesh sieve, and about 60% of it through a 200-mesh.

This is far from being an ideal ore in the zinc smelter's view. It is more troublesome, and more expensive, to roast slime than it is ore of coarser character, and there are other drawbacks. However, the zinc smelters just now are hungry for any kind of ore, and on the whole the proportion of flotation slime is not yet very large. The Butte & Superior management hopes to secure an improvement over its present ore contract on the ground of the dearth of ore. Whether it will achieve that or not will have to be left to time to tell. One thing is certain, the zinc smelters have got to learn how to handle the flotation slime, inasmuch as the quantity of it will increase, not only from Butte, but also from other quarters.

The Butte & Superior ships its slime without drying. In fact, its whole method of handling this product is clumsy and capable of improvement. No doubt attention will be given to this as soon as the management finds time. During the last year its hands have been pretty full with various kinds of trouble, most of which have now been remedied.

The Butte & Superior mill is a conspicuous example of the type of mill built on a steep side-hill location. From flotation concentrate bins to mine feed there is a climb greater than commonly falls to the lot of the mill man. Inside of the mill things look mussy, no doubt the result of the many changes that were first made last year; however, the milling results, from the standpoint of concentration, as reported by the company, appear to be beyond criticism, captious or otherwise. The flotation process uses about 4 to 5 lb. of pine oil and about 4 to 5 lb. of sulphuric acid per ton of crude ore treated.

The Princes' Trust

JENA CORRESPONDENCE

Last June the shares of the Hohenlohe Werke, A.-G., in Upper Silesia, suddenly commenced to tumble and, in connection therewith, it was rumored that the "Prince's trust" (sobriquet for the commercial partnership between Prince Christian Kraft zu Hohenlohe and Prince Alexander Egon von Fürstenberg, who owned a controlling in-

terest in the concern), had become heavily involved in a number of other enterprises of more or less doubtful value in which they had embarked, such as the Deutsche Hotel Co., four partially developed potash properties, the Berlin Real Estate Co., the Berlin Omnibus Co., department stores, banks, steamship companies, etc. To save themselves from serious disaster they had to call on the Deutsche Bank for succor.

It will be remembered that in the spring of 1912 they had a falling out with the bank on account of the summary dismissal of managing director Lob, of the Hohenlohe works, which did not meet its approval and led to the withdrawal of its representatives from the board. Since then things seem to have gone wrong with the Princes' trust, especially after the death of Herr Trippe, the successor of Herr Lob. Last July a new managing director was appointed suddenly in the person of Herr Schaltenbrand and soon it became known that the Deutsche Bank was busily engaged in straightening out the affairs of the Princes' trust. A large block of its holdings in Hohenlohe and in Lower Lusatian lignite stock was sold to Herr Petschek, the head of a syndicate of Bohemian capitalists, who had been making already a big inroad into other German lignite stocks, and a number of the lesser enterprises of the trust will be liquidated.

On Sept. 27 the Hohenlohe Werke A.-G. had its annual meeting, in which eight new directors were elected. Of these there are five in the banking business, two are technical men and one is Prince Hohenlohe himself. No doubt, some of the bankers are representatives of the Deutsche Bank. Herr Petschek has also a seat on the board. Subsequently it became known that the Hohenlohe Co. and Herr Lob, the ex-manager, who had suits pending in the court, had come to a compromise, according to which the latter receives a compensation of 900,000 marks from the company, corresponding to one year's salary plus his percentage on the profits, both parties withdrawing their suit and counter-suit.

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Iron-Ore Reserves of Cuba

In the Government's suit for the dissolution of the Steel Corporation, Charles F. Rand gave the following estimate of the iron-ore reserves of Cuba:

	Acres	Tonnage
Mayari District		
The Spanish American Iron Co.	39,173	500,000,000
Total Mayari		600,000,000
Levisa Bay District		
Guantanamo Exploration Co.	11,016	69,000,000
Various individuals (estimated)	3,000	15,000,000
Total Levisa Bay		84,000,000
Moa-Taco District		
The Spanish American Iron Co.	45,517	800,000,000
Bethlehem Iron Mines Co.	33,000	370,000,000
Buena Vista Iron Co.	19,841	300,000,000
Guantanamo Exploration Co.	7,152	141,000,000
Eastern Steel Co.	10,158	50,000,000
Piloto Mining Co. (U. S. Steel Corp.)	15,000	210,000,000
Various companies and individuals (estimated)	50,000	300,000,000
Total Moa-Taco		2,171,000,000
Camaguey District		
Bethlehem Iron Mines Co.	37,000	400,000,000
Total Camaguey		400,000,000
Santiago De Cuba District		
The Spanish American Iron Co.		3,500,000
Jurugua Iron Co.		2,500,000
Santiago de Cuba		6,000,000
Grand total		3,261,000,000

W. J. Olcott on Iron Mining

In his testimony in the Steel suit, W. J. Olcott stated that if given enough time to carry on negotiations, say a year or so, he could secure a large enough supply of ore to yield 1,500,000 tons per year for 50 years. The orebodies which he would secure for this purpose include none which are now owned by steel companies, nor the properties owned by the Longyear-Bennett and Hill interests, although these two groups of properties could easily be drawn on for a similar supply. The properties he had in mind, said Mr. Olcott, are scattered about on all of the different ranges, and he thought he could secure them on leases at royalties of 35c. to 80c. per ton.

I was more conservative about the future supply of ore 20 years ago than I am now. For instance, I figured then that the Norrie group, because of the geological formation there, would be exhausted in eight or nine years. The ore lay in a trough formed by a vein of quartzite and a dike of diorite, and I thought that when the bottom of the trough was reached the ore would be exhausted. But the ore was found to continue on the other side, below the meeting place of the quartzite vein and the dike, and the Norrie group is still being worked and there are indications that the ore will be taken out indefinitely. It is the same way with most of the other mines on the Gogebic range and the other old ranges.

Mr. Olcott said that it is just as cheap to acquire mines now as it was years ago.

He has come to the conclusion that the Baraboo, in Wisconsin, is not a range.

There is a big reserve of water there, but not of ore. We have spent lots of money in exploring there, but have been much disappointed. It is not a mining proposition.

The witness said that an attempt to monopolize the ore reserves of the Lake Superior district would only serve to stimulate activity in exploration work and that as a consequence the amount of known tonnage would be greatly increased.

Mr. Olcott said that his whole mining experience on the old ranges has shown that mining operations may be carried down to almost any depth. The Chapin mine, on the Menominee, has been worked from 700 ft. in 1885 to 1400 ft. in 1913. The ore remains of the same quality, the vein of the same thickness, and the capacity as large. The Ashland mine, which had been worked to a level of 700 ft. in 1887, is now down to 1200 ft., and the production and quality of the ore and the thickness of the vein are the same. The mines of the Penokee-Gogebic company have been worked to levels of about 1400 ft., with the same results. In fact, said Mr. Olcott, today the prospects for depth are considered better than they were 20 years ago, as far as the old ranges are concerned. Results have shown that the ore at low levels is present in the same quantity and quality as near the surface. All that is necessary to work the lower levels is to install heavier hoisting machinery and to spend more money for fuel. The added cost per ton, however, is inappreciable. The lowest iron-ore working in Michigan, he said, is at the Newport mine, where ore is being mined at 2400 ft. The ore is of the same grade, and the vein of the same width as in former years.

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The Ratios of Productive to Nonproductive Work in some of the Butte shafts are as follows: Speculator, 1:2.12; Diamond, 1:1.52; High Ore, 1:3.34; Mountain View, 1:2.22 (A. I. M. E. Bulletin, September, 1913). These figures represent the ratio of effective horsepower developed in hoisting ore to effective horsepower developed in hoisting men and material. The greater consumption of horsepower in nonproductive work is largely due to the fact that such operations are conducted out of balance and the dead load of skip, cage and rope is exceedingly heavy.

Grinding Ores for Cyanidation—I

By Herbert A. Megraw

SYNOPSIS—A discussion of machines used for breaking, crushing and grinding ores preparatory to cyaniding. Characteristics of the machines and their applicability for different work. Results of practical operation are shown.

However widely opinions may differ on the various details in milling, little difference is expressed about the first step of the process—rock breaking. There are a certain number of standard and approved types of machines for this work, and they all seem to be able to perform their duty efficiently and economically, without widely differing costs. If concordance is the rule in this department, however, it is about the only one of which the statement is true. After the ore has passed through the breakers and is laid in the mill bins, opinions about appropriate handling begin to diverge and remain separated more or less widely during the entire treatment.

According to the character of the rock mined, its physical condition when it reaches the surface varies. It may be principally in large boulders, or mainly in small shattered particles. Gold and silver ores may be said to fall usually in the grades varying from medium to very hard. While there are instances of ores which are soft and readily broken, these may be considered exceptional. They do not involve the use of distinct methods of reduction, so that the discussion of any machine or method of subdivision will be of equal force whatever the character, with certain exceptions which will be mentioned.

Varied Preparation of Ore for Milling

The first breaking of ore is done in large gyratory or jaw breakers, which may be situated either at the mine or at the mill, in those instances these two points are not the same. Then the mill bins receive it and deliver to the milling system.

Ore delivered to the mill bins varies in size from heavy boulders to fine dust. The preliminary breaking machine, gyratory or jaw type, as the case may be, will usually have broken up the larger boulders, leaving pieces of a maximum diameter of perhaps four to six inches. These large pieces must be broken in smaller machines, usually of the jaw type, but before reaching these machines it is better practice to pass the whole of the ore over a grizzly, bypassing any material which does need that treatment. The size of the material delivered by these machines depends upon the type of those which immediately follow them, but may be said to be generally such that its pieces of greatest size have a diameter of from one to 2½ in. At this point diversity of opinion begins and there are a large number of machines competing for place.

Stamps Most Popular Machines

Among the machines which are used for taking ore from the finer breakers, undoubtedly first place as to popularity must be given to the stamp mill. This machine has been so universally used through many years that it has a strong hold upon the industry which it seems impossible to loosen. There is very little doubt that, at least in many localities, it is by no means the best one for the work. It is, however, reliable, but fails most notably when cost is taken into consideration. Many operators seem to be convinced that the gravity stamp is operated more cheaply than any other crushing machine, but this has certainly not been generally proved.

Table I has been compiled to show the work which is being accompanied by some well known stamp installations. It is not given with the idea of enabling comparisons to be made, but rather to indicate that in such a diverse collection of facts, comparison is not likely to be valuable. The list is not, of course, complete; it makes no attempt at being so, but does show the tendency of modern American practice toward crushing coarsely in the mortars and regrinding in more appropriate machines. The older stamp installations are lighter, crush finer and are usually found in those plants where sand and slime are separately treated.

TABLE I. STAMP-MILLING PLANTS

Mill	No. Stamps	Weight, Lb.	Drop, In.	Drops per Min.	Feed Character	Av. Size	Screen Used	Regrinding Machine
Goldfield Con	100	1050	7	108	Alunite	1½	4 mesh	Chilean mill
Homestake	1000	920	9	88	Var.		30-35 mesh	Tubes and pans
Mexican	10	1250	6	104	Quartz and clay	2	4 mesh	Chilean mill
Dome	40	1250	6½	100	Quartz and schist	1½	10 mesh	Tube mills
Hollinger	40	1500	6¼	100	Quartz and schist	2½	6 mesh	Tube mills
Liberty Bell	80	850	7	106	Quartz and calcite	3	12 and 14 mesh	Tube mills
West End, Tonopah	20	1200 / 1300	6½	101	Quartz	1		Tube mills
Montana Tonopah	40	1100	7½	102	Quartz	2	25 mesh	Tube mills
Tonopah Extension	30	1050	7	100	Quartz	2	3 and 12 mesh	Tube mills
McNamara	10	1400	8	98	Quartz	2	8 and 12 mesh	Tube mills
Nevada Hills	20	1250	6½	107	Hard quartz	1½	8 mesh	Tube mills
Nevada Wonder	10	1400	8	96	Quartz	2½	¾ in.	Chilean and tube mill
North Star	40	1000	7	110	Quartz	2	30-mesh size	None
Black Oak	20	1250	6	102	Quartz	2	20 and 6 mesh	Tube mill
Gold Road	40	1050	7	104	Quartz and calcite	2½	4 mesh	Tube mills
Tom Reed	20	1250	6	105	Quartz	3	12 mesh	Tube mills
Vulture	20	1600	6½	98	Quartz	2	40 mesh	Pans

Rolls as Primary Crushers

The efficiency and cost of stamping ores in comparison with other machines will be taken up later, first making a survey of the most popular devices which have been used in their stead. Among the first of these, we must mention rolls. Rolls have been very largely used as crushers for many years, but they have comparatively seldom found their way into cyanide plants. They have been used principally in concentrating mills for all kinds

Note—This is the third of a new series of articles by Mr. Megraw. The series deals with comparative details of cyanide practice, discussing points of possible improvement. Preceding articles of this series appeared in the issues of Sept. 6, 1913, and Oct. 4, 1913. The next article will deal with "Grinding Ores for Cyanidation, II," and will appear in the issue of Nov. 15, 1913.

of ores and are, perhaps, the favorite machines where very large quantities of rock are handled.

The particular advantage of rolls, which has led to their wide use in concentrating mills, is that the distance between the roll shells is a fixed measurement. That is to say, that material which is smaller than that opening, and consequently does not require further crushing in that machine, will pass through it without receiving that crushing, and all material too large to pass the opening, will be broken so that it will pass. The passage of the undersize material without further crushing is an advantage in concentrating mills where a product of a definite size is required, but in cyanide mills this would really be no great advantage. At the same time, it is by no means a disadvantage, and constitutes no reason why the rolls should not be used in cyanide plants. As a matter of fact, stage reduction, through breakers of two or more sizes, and rolls of one or more sizes, is probably the most economical way in which ore can be broken from large pieces down to a product containing maximum-sized fragments of about ¼ or ½ in. diameter. Clearly a product of this size is not to be crushed economically to smaller size in stamp mills, and this may be one reason why rolls are not more largely used for cyanidation. The stamp mill has been such a popular reducing machine that anything which interferes with it, whether the ultimate result is better or not, is likely to receive scant attention. Plants which use rolls have no use for stamps, and the material delivered from rolls could go directly through stages of grinding machines, such as chilean mills, tube mills, or others, which will be mentioned later.

Examples of large mills which are using rolls for primary crushing, may be found in the Cripple Creek district of Colorado, where both Stratton's Independence[1], and the Portland mills use breakers and rolls without any stamp installation. The well known Mogul mill[2], in the Black Hills of South Dakota, used roll crushing in the installation which was burned down a year or two ago, and will, it is said, practically duplicate that crushing installation in the new plant, which is now under construction.

Chilean Mills Efficient

Aside from rolls, there are a number of machines which are used, more or less, in the primary stage of ore crushing for subsequent cyanidation. Probably the most important of these machines are the chilean mills, of which there are various types, all descended from the original stone-wheel edge runner. Of chilean mills, there are two classes, those operated at high speed, usually having small diameter and small crushing wheels, and the slow-speed mills which usually have dies of larger diameter and the crushing wheels of which are large and heavy, and often multiplied in numbers, some mills having as high as six or eight runners. The high-speed mills are from 4 to 6 ft. in diameter, the diameter in this case referring to the measurement across the dies. Slow-speed mills run from 6 to 10 ft. in diameter and sometimes larger. With the high-speed mills, the crushing wheels are usually only 2 or 3 ft. in diameter, and of narrow face, 4 to 6 in. The slow-speed mills may have wheels up to 7 or 8 ft. in diameter and up to 20-in. face measurement.

High-speed chilean mills are more largely used than the slow-speed ones, and seem to have a firmer hold upon the respect of operators in general. They are used quite often as regrinding machines, following rolls, breakers, or, in some cases, even stamps. At the Goldfield Consolidated plant one sees an example of high-speed chilean mills following stamp crushing. Here the stamps put the ore through a 4-mesh screen, delivering to the chilean mills an over-size product, having a maximum diameter of somewhat less than ¼ in. The mills are Trent, 6-ft. machines, which deliver nearly 50% of a product passing a 200-mesh screen. The mills are said to crush 75 tons per day, practically all of the feed being coarsely-granular material.

Coarse Feed Better for Chilean Mills

Due to the fact, which I believe is generally acknowledged, or at least ought to be, that the greatest efficiency of a chilean mill, either high or slow speed, is attained on material which is considerably coarser than that sent to the Goldfield chilean mills, their work may not be considered ideal, but under the conditions, good. Viewing this matter from another point, there seems to be no reason why rolls should not be used for the preliminary crushing of this ore, delivering to the chilean mills their product, the maximum size of which will vary from ¼ to ½ in. in maximum size. In this case, the cost of primary crushing would probably be considerably less than with stamps, as it is generally understood, and the chilean mills could be made to perform more efficient work. One objection which might be urged against the rolls under such circumstances is that cyanide plants usually prefer to crush in solution, and the advantage of the dissolving power in the crushing machine is lost when rolls are used. Rolls are not usually considered efficient wet crushers, although occasionally they are so used, an example being the Trojan[3] mill in the Black Hills of South Dakota. Nevertheless, in the case of the Goldfield Consolidated, crushing is performed in water and no advantage is gained in this way by the use of stamps.

Examples of just this method of crushing, namely, rolls followed by high-speed chilean mills, may be found at Stratton's Independence[4], at Cripple Creek, and at the Portland mill at the same place. The process at Stratton's Independence has already been described and the results indicated. At the Portland mill, Blake crushers are used, followed by a disk crusher and fine and coarse rolls. The material from the rolls, which will average from ¼ to ⅜ in. maximum size, is passed to 6-ft. Akron chilean mills, making 34 r.p.m., crushing through 30-mesh wire slot screens. These mills are said to crush as high as 125 tons of this material per 24 hr. At Stratton's Independence the work of the chilean mills is along the same lines and closely comparable. These data have already been published, but are appended herewith in Table II, for purposes of comparison. High-speed chilean mills are used in a large number of plants and it would be impossible to name them all. Some of the most important, however, are included in the table.

Slow-speed chilean mills are used in a number of instances but have not, up to this time, proved as popular as the high-speed machines. It is somewhat difficult to account for the general opinion of this machine, as many published reports of its work show it to be superior

[1]"Eng. and Min. Journ.," Feb. 8, 1913.
[2]"Eng. and Min. Journ.," Aug. 5, 1911.
[3]"Eng. and Min. Journ.," Dec. 28, 1912.
[4]"Loc. cit."

in many vital points to the high-speed machines. Work done by an old-style chilean mill was published by me some time ago[5], the results of which are included in Table III for comparison. Also, the work of slow-speed machines at the Gold Belt mill, published in a former issue of the JOURNAL[6], are herewith reproduced. The efficiency of the slow-speed mill has been compared with other grinding machines by Walter H. Urbiter[7], using the Stadler method of comparison. This comparison shows the slow-speed chilean mill to be of high merit as a grinding machine for producing a large amount of extremely fine material.

The slow-speed machine has a decided limit in the work which it will perform. It can be considered in no sense a regrinding machine. It does its best work on coarse material, passed once through the mill, using with it a large excess of water or solution, whichever may be used in crushing. Some of the tabulations used by Mr. Urbiter are reproduced in Table IV for comparison with other machines. One passage through a slow-speed chilean mill is sufficient, almost always, to grind a very high percentage of the ore at one step to such a point that it will pass through a 200-mesh screen. The tabulated results of the product of many mills show this conclusively. It is a mistake, however, to attempt to use the chilean mill either as a regrinder or as a grinder on moderately fine material. I found that by feeding over-size, running from 80 to 40 mesh, to a slow-speed chilean mill, the product bedded and packed down upon the dies and no grinding, to amount to anything, was performed. Also, in returning over-size to a chilean mill for further grinding, together with the coarse material as originally fed, the result was to diminish largely the capacity of the mill and not to offset that disadvantage by any great increase of slime delivered by it. It is more than probable that the product of the chilean mill, speaking of slow-speed machine, should be classified, and if the over-size is to be reduced to slime it should be handled by some other machine. A slow-speed chilean is not an efficient regrinder of fine material.

[5]"Eng. and Min. Journ.," Nov. 12, 1910.
[6]"Eng. and Min. Journ.," Aug. 12, 1911.
[7]"Loc. cit."

TABLE II. CHILEAN MILLS

High Speed

Mill	Type	Speed R.p.m.	Capacity Tons per Day	Screen Mesh	Feed Size	Feed Hardness	Product % +20	+30	+40	+50	+60	+80	+100	+120	+150	+200	—200	Power H.p.
Portland	Akron, 6 ft.	34	124	30	½ in.	Hard	....	....	....	....	....	....	.....	.....	.....	.....	.....	..
Independence	Akron, 6 ft.	33	120	30	⅜ in.	Hard				21			12		5	62		55
Goldfield	Trent, 6 ft.	32	75	30	4 mesh	Medium		4		10		16	9		6	6	48	75
Mogul	Monadnock	..	105	30	1.5 in.	Hard		14.5			17.8		12.6			15.7	39.4	45

TABLE III. CHILEAN MILLS

Slow Speed

Mill	Type	Speed R.p.m.	Capacity Tons per Day	Screen Mesh	Feed Size	Feed Hardness	Product % +20	+30	+40	+50	+60	+80	+100	+120	+150	+200	—200	Power H.p.
Gold Belt	Lane, 7 ft.	18	25	None	1 in.	Hard	0.1	0.27	0.37		1.50	3.87	8.10	....	....	35.79	50.0	10
Sta. Elena	7 ft.	15	25	40	2 in.	Hard quartz					1.15	5.65	0.15			25.75	67.3	15
La Union	8 ft.	10	20.0	None	1.5 in.	Medium						0.30	1.50		13.45	4.75	80.0	13
El Bote	A.C. 8 ft.	12	18.6	None	2 in.	Hard										30	70.0	13
*Defender	Lane, 10 ft.	8	36	None	*	Medium			0.54			5.80	13.70			30.51	69.5	10
*Llano	Lane, 10 ft.	8	48	None	1 in.	Very hard		0.42	0.858		2.37	5.34	13.84	3.65		3.48	70.0	10
Musgrove	Lane, 10 ft.	8	25	None	1½ in.	Extremely hard							0.00			30	70.0	10

Private correspondence.

TABLE IV. CRUSHING EFFICIENCIES BY STADLER'S METHOD

Chilean Mills	Final Pulp Grading	Tons per Horsepower-Day	Relative Mechanical Efficiency
South Dakota, high-speed, 3-roller	39.4% through 200-mesh screen	2.35	55.73%
Santa Elena, 2-roller, slow-speed	67.3% through 200-mesh screen	1.84	49.00%
La Union, 2-roller, slow-speed	80.0% through 200-mesh screen	1.70	46.13%
El Bote, 2-roller, slows-peed	70% through 200-mesh screen	1.43	38.77%
Stamps and Tube Mills			
East Rand, working figures—Marriott's report	90% through 90 mesh	1.53	40.48%
East Rand, working figures—James' report	90% through 90 mesh	1.33	32.20%
East Rand, Argall's report—10-stamp test	99.5% through 90 mesh	1.74	49.98%

OTHER MACHINES USED

The ball mill is another type of grinding machine which has been used for breaking down fairly coarse ore to medium size. The lack of success of this machine, in general, has led operators to exclude it from serious consideration. It is expensive in operation, has not large capacity, and in general, does not succeed in competing with either stamps, rolls or chilean mills.

For fine grinding, the tube mill, taking oversize sand from other machines, is probably the best adapted, where a total slime product is desired. Tube mills are so widely used that there is very little argument to be made about them, and nothing to be said except that they fully justify their use. Various types of tube mills have been used, and in some cases efforts have been made to increase its efficiency by somewhat changing its form. Among the machines which have been highly recommended for certain work, as developments of the tube mill, may be mentioned the Hardinge conical mill. This well known machine is simply a cone-shaped tube mill. It has been highly successful in certain lines of grinding and for making certain grades of product, but its success along these lines has unfortunately led its advocates to recommend it for work which it will not economically perform. No doubt the Hardinge mill is highly successful in producing a thoroughly fine, granular product suitable for concentration, but when it comes to producing an extremely fine slime economically, it has not proved at all successful. The chilean mill greatly excels it for this purpose, as does also the straight tube mill, and perhaps other machines.

PANS USED FOR FINE GRINDING

Pans of the Wheeler type have been largely used for regrinding ores, and not so many years ago there was a great agitation of the question of pans *versus* tube mills for making slime. Australian metallurgists have been accustomed to use grinding pans to a large extent, with the result that their work attracted the attention of other operators and the pan received trials in competition with tube mills and other machines. Due to the outcome of these trials, the pan lost its popularity, and is now seldom

used except in small installations where first cost is a controlling factor. No doubt the efficiency of pans could be increased by such methods as described by G. F. Söhnlein[8], by means of which the pulp is made to enter the center of the pan, and cannot be discharged from it except by passing under the grinding millers. The former method of simply delivering the product into the pan and expecting it to be ground, proved disappointing. The speed of the mullers threw the heavy material, the part which needed grinding, by centrifugal force to the periphery of the pan, and it was not ground to any great extent, while the pulverized, light material, which needed no further grinding, was the portion which received it. Probably the lack of efficiency for this reason was one of the points which made the pan unavailable for successful, economical work.

Other Machines Used for Grinding

Among the machines which have achieved a measure of success in regrinding sand and moderately coarse material, may be mentioned the Huntington mill, which at one time had a very large following among metallurgists. The Huntington mill is a variation of the edge-runner type in which the die stands vertically and the crushing wheel horizontally hung on a shaft which is pivoted about 2 ft. above the crushing point. Familiar as these mills were at one time, they have amply shown their inapplicability to almost all kinds of grinding because of their high maintenance expense. Huntington mills are seldom used now, and one rarely finds them in cyanide plants.

The Bryan mill is really a high-speed chilean, slightly modified, but identical in all practical respects. It may be included in the class of high-speed chilean mills, and is used in many plants for identical purposes. There are a large number of variations of the chilean mill being used for grinding purposes, but it is difficult to find any of them which are an essential improvement on the standard types. Among the variations of high-speed chilean mills, one finds various types of quartz mills having freakish differences from the standard. Some of them have round-faced wheels running in a round-grooved tire, while others are concave, and run on a convex die. Others, such as the Schranz mill, are a sort of a combination, this one having beveled rollers and a beveled track. The Griffin and the Kinkead mills are other comparatively well known variations, which have seen service in some plants, but which have not become recognized as standard assistants to successful milling.

Many Types of Ore-Breaking Machines

Having discussed these variations of regrinders, it would not be well to omit mention of some of the variations of ore-breaking machines which have been suggested for handling coarse ore. Attempts have been made to apply machines successfully in coal mining work to the crushing of hard ores, but generally without any success. Most of these machines succeed in grinding themselves up about as fast as they do the ore. One which may be somewhat different is the Williams hammer mill, which has already been described[9], as installed at the San Poil mill in the Republic district, in the State of Washington. While this machine has by no means demonstrated its success as an economical crusher of coarse ore, it still has done such work as to entitle it to a further trial extending over considerable time. With machines of this class, economy is to be the deciding point. The Williams machine surely does break up ore at an extremely rapid rate, but it would seem too much to expect that the wear on the machine would not be correspondingly great. If it can be proved that it is not, the mill will have, undoubtedly, a field of useful work.

Of the many styles of gyratory, jaw and roll crushers, which differ from standard practice, it would be impossible to give any interesting account. There are too many of them, and their success or use is so problematic that they are not entitled to serious attention.

The machines already mentioned include practically all of those which have been used for regrinding in cyanide work. There have been other machines, many of them of a freak nature, which have achieved temporary renown, but they have not proved their eventual applicability. Some of them have long since passed out of the memory of the practical operator, while some others are still fighting for a foothold. Whatever may be their merits, as they have not proved them, they cannot be considered at this time as factors.

I arbitrarily divide the reduction of ore into three sections. The first of these may be called breaking, and is performed by the use of the various machines classed as rock breakers. Sometimes these machines have been referred to as crushers, but I prefer to reserve that word for the second stage, including such machines as stamps, ball mills, chilean mills, of the fast and slow types. The third stage I call regrinding, that is, reducing to a fine-granular or slime state.

[8]"Eng. and Min. Journ.," Sept. 27, 1913.
[9]"Eng. and Min. Journ.," Apr. 26, 1913.

The Photostat

The photostat is a new and useful instrument that is being introduced by the Commercial Camera Co., of 323 Grosvenor Building, Providence, R. I. Its function is to copy drawings and documents. It does this by the application of photography, the essential feature of the instrument being a camera, combined with which is a developing apparatus. The sensitive paper is supplied in a roll, from which the camera is fed. After exposure, the paper passes directly into the developing bath, where it remains for 30 seconds, whence it passes into the fixing bath, after which the paper is washed and dried ready for use, all of this being done automatically by the instrument. The result is a photograph on durable, bromide paper. The whole operation is performed in less than one minute.

The sensitive paper comes in a roll of 350 ft., 11½ in. wide. An automatic device measures off the paper in lengths of either 14 or 17 in. This determines the size of the photographs, which are either 14x11½ in. or 7x11½ in. A subject larger than 14x11½ in. may be reduced to those dimensions; if small, it may be enlarged up to that limit.

The instrument photographs any color. Consequently, a reproduction of any sort of a map may be obtained. A photostat print shows white lettering on a dark background. To make a copy with white background and black lines, as in the original, the first photostat print may be finished and then placed on the copy board and photographed, giving the result desired. The photostat

may be operated by daylight, but for steady work the best results are obtained by using electric light.

The instrument costs $500. The bromide paper costs $14 per roll of 350 ft. According to the manufacturer, the cost of a photostat print 14x11½ in. does not exceed 5½ cents.

This is an extremely convenient apparatus for the counting room, drafting room and engineering office. Two important American mining companies recently equipped themselves with it.

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The Reduction of Ferric Oxide by Ferrous Sulphide

By Lewis T. Wright*

In a suggestive article by E. W. Walter on "Magnetite in Mattes and Slags," which appeared in the Journal of Jan. 25, 1913, reference is made to some remarks by Roberts-Austen, who in his "Introduction to Metallurgy," states that:

> When ferrous silicate containing less than 30% of silica is exposed in a molten condition to the action of the air, the iron in excess gradually becomes oxidized and crystals of magnetic oxide are formed. These fall by their superior density to the bottom of the mass. Sometimes, as when such a slag covers a bath of impure metal, the magnetic oxide thus formed gives up its excess of oxygen to the elements in the metal to be refined and again becomes ferrous oxide and thus acts as a carrier of atmospheric oxygen to the carbon which has to be oxidized.

It should be noted that Roberts-Austen states that the oxygen is given up to the elements in the metal to be refined, and only specifically in this passage mentions carbon as one of the elements. Nothing is said here about sulphur or ferrous sulphide.

However, among certain equations given in the same work, Chapter IX, Thermochemistry, p. 348, fourth edition, is one which gives to ferric oxide the power of reducing ferrous sulphide to ferrous oxide, viz.:

$$Fe\,S + 3\,Fe_2\,O_3 = 7\,Fe\,O + SO_2$$
$$23.8 + 3 \times 199.4 - (7 \times 66.4 + 71) = +\,85.2$$

This equation, so far as it indicates that three molecules of ferric oxide oxidize one molecule of ferrous sulphide to ferrous oxide and is reduced itself to six molecules of ferrous oxide and oxidizes the sulphur to one molecule of sulphur, has a familiar appearance and seems to have been accepted by metallurgists. I cannot at the moment cite any older reference, but I think I had seen it before meeting it in Roberts-Austen's work. I do not know its history; I came across it quite recently again in Laist's article on the "Chemistry of the Reduction Process in Use at Anaconda, Mont." (Bull. A. I. M. E. No. 73), without the thermochemical data. As given by Roberts-Austen, it has made for me a great deal of trouble, and I want to see it dead and buried and forgotten.

In the first place, its arithmetic is wrong because its heat value would be negative, i.e., —86.2 and not +85.2. It would be endo- and not exothermic. But in another respect it gave me trouble. I worked hard in practice to get the degree of oxidation it offers and could not succeed. It afterwards occurred to me that it might have no existence in fact and for the following reason: It is commonly believed that copper mattes contain magnetic oxide ($Fe_3\,O_4$), which is a higher degree of oxidation than ferrous oxide. I personally accept the direct and indirect evidence I have been able to get, that mattes do contain commonly more or less $Fe_3\,O_4$ and sometimes quite a good deal. Indirect, because of the deficiency resulting generally from the allocation of all the iron to ferrous sulphide and direct because of determinations of the magnetic oxide as such and production of water from the matte when heated in a current of hydrogen.

I am also satisfied that mattes contain ferrous sulphide. There is then the everyday experience that magnetic oxide and ferrous sulphide can exist together peaceably in copper matte and are neutral to each other at furnace temperature and yet, in the face of that, we have this equation that shows that ferric oxide can be reduced by ferrous sulphide to ferrous oxide. If ferric oxide is reduced to ferrous oxide, why does the ferrous sulphide not reduce the magnetic oxide? Why should the deoxidation of ferric oxide go so far as ferrous oxide, and magnetic oxide be not so deoxidized, but remain in its higher degree of oxidation in the presence of molten ferrous sulphide? The answer is that ferrous sulphide cannot reduce ferric oxide to so low a degree as ferrous oxide. It can only reduce it to magnetic oxide and the familiar equation is wrong.

Simple experiments will convince the engineer that: (1) Magnetic oxide and not ferrous oxide is produced by melting ferrous sulphide with ferric oxide; (2) that ferrous sulphide and magnetic oxide do not react to give sulphur dioxide, but are neutral to each other; and (3) that nearer 10 molecules than three molecules of ferric oxide are required to burn out the sulphur of ferrous sulphide and that the reaction is probably better represented (using the same thermochemical equivalents employed by Roberts-Austen) as:

$$Fe\,S + 10\,Fe_2\,O_3 = 7\,Fe_3\,O_4 + SO_2$$
$$23.8 + 10 \times 199.4 - (7 \times 265.8 + 71) = -86.2$$

and that the old equation should disappear from our books.

One problem often leads to another. If $Fe_3\,O_4$ is formed in our furnaces or is put into them, it must be reduced, if at all, by some other agent than ferrous sulphide. It can, of course, be reduced by carbon and carbon monoxide, and perhaps by other means.

Recently Mr. Flynn (Eng. and Min. Journ., Apr. 12, 1913) has given an account of a most interesting experience that happened to him in the use of magnetite as an iron fuse and consequent troubles with "mushy" matte. I have read few such stories with greater sympathy than this of a furnace outlet being chronically frozen up with mushy matte and the heroic efforts to keep it open, and how the trouble was finally cured.

Sixteen years ago I had a very similar experience, excepting that in my case the magnetic oxide was formed in the furnace. The blast furnaces were in a chronic state of freeze-up, owing to mushy matte blocking the spouts, a trouble that was attributed to the presence of a little zinc in the ore. The layout of the mine had been nearly ruined by endeavors to mine ore free from zinc. The metallurgy was all muscular, and night and day the sounds of hammer strokes on steel bars dominted all others and became monotonous.

One morning the smelting-works superintendent came to my office, tendering his resignation and that of the blast-furnace foreman. They were at the end of their energies and stated that they had done their best and could do no more. The situation was at the point where

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I wanted it. I did not want to lose two splendid men, but I had to have them confident in what they were doing, if they were to stay. The furnaces were being worked with a very shallow charge. I told them to fill them up level with the charging floor. This was done, and from that afternoon we never saw mushy matte again and the trouble was quickly forgotten. I do not say that the charges were always thereafter kept up to the level of the charging floor, but they were never thereafter so low as they had been during the trouble. The mushy matter was overloaded with magnetic oxide. Mr. Flynn had the same trouble and cured it in the same way. The shallow charges did not give reducing reactions a chance, and it occurred to me to try an exactly opposite condition. I was depending upon the reducing action of the carbon of the coke and I wanted to give this a full opportunity.

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Stratton's Independence Income-Tax Case

WASHINGTON CORRESPONDENCE

The Government has filed a reply in brief with the Supreme Court in behalf of F. W. Howbert, Collector of Internal Revenue for the District of Colorado, in the case of "Stratton's Independence, Ltd.," this being the case involving the applicability of the corporation tax to mining corporations, the contested issue in which was the matter of depreciation allowance. Three questions were certified to the Supreme Court—whether the act applies to mining corporations, whether the proceeds of ores mined by corporations are income, and whether if they are income such a corporation is entitled to deduct the value of ore as depreciation.

After contending that the act is applicable to mining corporations, the Government brief goes on to argue that the proceeds of the ore are income, contending that:

> When capital is by labor changed from a fund into a flow, it necessarily changes its character from capital to income. In the case of a mine, the mineral as it lies in the ground is capital, but when it is extracted, converted into ore and sold, the result is a flow; the tree has borne fruit, and income has accrued. The argument that, since this flow necessarily results in depletion or exhaustion of capital, therefore, the flow is a flow of capital and not of income, is entirely fallacious, according to the above definitions, the understanding of business men, and the practical necessities of a tax based on income. The law takes things as it finds them; it taxes property under the character which the owner has impressed on it, and where that owner voluntarily changes his funds of capital into a flow of income the law accepts the designation and taxes him accordingly.

The brief goes on to say that an ordinary life tenant may not open new mines, but when opened he may work them even to exhaustion, while a lease by the state of the mineral under its public land would not be a sale of such lands and the payment of dividends by mining company out of the proceeds of ore is not a payment of capital. Moreover, the fact that the operation of a mine may decrease its valuation does not prevent profits not spent in dividends from being called surplus. Lastly, it has been held by the Supreme Court of Pennsylvania that oil companies and mining companies have incomes within the meaning of an income-tax act. In summing up the Government says that:

> The principle for which the mining companies contend is not applicable to them alone, and if applied generally, as it must be if applied at all, would seriously hamper the working of an income tax. A pension or a terminable annuity produces an income at the expense of capital, but who would think of calling such produce any the less income?

As for the claim that depreciation ought to be allowed on the ore the Government says:

> In the absence of any showing to the contrary, the word "depreciation" here must be given its ordinary meaning in business usage, and also it must be taken as similar in meaning to a "loss." So considered, depletion of capital cannot be called "depreciation," nor would any business man think of so calling it. When capital is converted into income, as when a loaf of bread is eaten, it cannot be said that the capital has "depreciated"; it has merely been converted into another form. "Depreciation" takes place when the capital, retaining its form, decreases in value owing to wear and tear, change of fashion or methods of manufacture, or the like. When a fund of capital in a mine consisting of the ore in place is converted into a flow of income resulting in money to the owners, the ore has not depreciated; it has suffered a change. Gold is mainly valuable because it does not depreciate. The buildings, machinery, shafts, etc., do depreciate. They retain their form and use, but their value diminishes at different ratios with different causes. If a man have a stock of goods and he sell some and the balance becomes worthless through a change of fashion, it would be absurd to call the two processes by the same name, nor would any business man carry the results to the same account. In fact in the Nipissing Mines Co. case, in which a writ of certiorari from this court is asked, the company in its second return abandoned the theory of depreciation and replaced it with the items "return of capital," "distribution of capital nontaxable."

In closing, the claim is made that because the mining company never actually retained any sum and applied it to depreciation, but distributed the income in the form of dividends, no claim for depreciation can justly be made. The brief further undertakes to apply the reason in the case to coal-mining companies, as well as to those engaged in metal mining.

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Grecian Chromiferous Iron Ores

According to Herbert K. Scott (*Trans.* Iron and Steel Institute, May, 1913), chromiferous iron in commercial quantities occurs in the western part of Greece, in the states of Lokris and Boitio, and on the islands of Euboea, Skyros, and others of the Greecian Archipelago, the most important ones being situated in the district bounded by the bed of the drained Lake Copias and the west coast of Talanta Channel. They are all within a few miles of the coast, along which excellent harbors are numerous. Operations are conducted by eight important concerns, the combined output of which up to the end of 1912 was about 1,930,000 tons. The ore consists of hard grains and nodules, up to ½ in. diameter, of hematite combined with a matrix of more hydrated, amorphous and softer ore, and occurs in lenses and fissures in association with limestones and serpentine. The average composition of the ore (dried at 212° F.) from different deposits is as follows: Fe, 46 to 52; Al, 6 to 14; SiO_2, 5 to 11; Cr, 2 to 3; Ni and Co, 0.10 to 1.2; P, trace to 0.03; S, 0.02 to 0.05; Ti, trace to 0.30%. The cost of quarrying is about $0.60, and of mining, about $0.72 per ton; transport to harbor, in the most expensive case, is $0.24; the total cost, including state charges, of putting the ore into vessels is about $1.21 per ton, and the selling price, f.o.b., is about $1.45 per ton. Freight rates to western Europe are now about $1.70 per ton. The ores are similar in many respects to the Mayari ores of Cuba, and, it is thought, may be utilized in the same manner for direct smelting into special irons.

Russian Iron and Coal

The make of pig iron in Russia for the past two years is given by a recent official report as follows, in metric tons:

	1911	1912	Changes
Foundry iron	681,898	730,942	I. 49,044
Steel making irons	2,801,668	3,355,590	I. 553,922
Special iron	109,598	111,106	I. 1,508
Total	3,593,164	4,197,638	I. 604,474

South Russia was the largest producer in 1912, making 67.7% of the total. The Ural, with 19.7%, was the second.

The production of steel ingots is given as follows, in metric tons:

	1911	1912	Changes
Acid converter	509,762	596,854	I. 87,092
Basic converter	156,937	190,254	I. 33,317
Open hearth	3,188,481	3,649,218	I. 460,737
Crucible, etc.	90,417	61,867	D. 28,550
Total ingots	3,945,597	4,498,193	I 552,594

The acid converter or bessemer steel was made altogether in South Russia and the Urals.

The production of finished steel as reported was 3,320,341 tons in 1912, and 3,727,105 in 1913; an increase of 406,764 tons. The larger items of this production in 1912 were 1,286,158 tons bars, shapes, etc.; 623,914 tons rails; 457,002 tons plates; 362,403 tons sheets; 287,305 tons beams, angles and girders.

The output of coal for the two years was as follows, in metric tons:

District:	1911	1912	Changes
Donetz basin	19,934,460	21,284,172	I. 1,349,712
Dombrova	5,914,818	6,461,910	I. 547,092
Urals	694,512	776,412	I. 81,900
Central Russia	178,543	211,302	I. 32,760
Caucasus	55,692	68,796	I. 13,104
Total	26,778,024	28,802,592	I. 2,024,568

The total increase last year was 7.6%. The Donetz basin is by far the largest producer, mining 73.9% of the total.

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Michigan Copper Mines That Will Close for the Winter

SPECIAL CORRESPONDENCE

Several of the mines in the Lake Superior copper country will remain closed all winter. Among these are the Franklin, Mass Consolidated and the Tamarack, the last a Calumet & Hecla subsidiary. The Tamarack has been experiencing considerable difficulty maintaining a position where it would not show a loss in operations. When the price for copper was low the management actually considered closing the mine for some time. Only consideration for the men employed at the property prevented action of this nature. Now, however, with a scarcity of workingmen in the district there is no real reason for reopening the property. The loyal workingmen, residing in Tamarack houses, are given employment in other mines of the district. In fact, most of these already have positions at the Calumet & Hecla.

At the Franklin property nothing is to be gained by reopening the property in the immediate future. The strikers were notified some time ago, by the management, that their places would be filled by other men, whenever the company decided to reopen the mine, which will not be for some months anyway. At the Mass Consolidated the shafts have been boarded up and there will be no effort to open the mine until next spring. It is believed that by that time other miners can be secured for these properties.

At the Calumet & Hecla 1200 men are at work underground. This is two-thirds of the normal underground force. Of the trammers, about one-third have returned to work. At the Quincy 120 men have been brought in from outside the copper district. These men are working and are pleased with their jobs, their pay and the situation. Notable acquisitions to the working forces have been made recently at the Trimountain and Champion mines, mostly among miners who left in the early days of the strike and went to the iron mines or to Butte. These men are coming back to get their old places again. Their experiences in the iron district and in Butte were convincing to them that the copper mines are pretty good places in which to work.

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Method of Financing Mining Property

BY S. M. SOUPCOFF*

Few except those well acquainted with the mining industry can appreciate the efforts being made by the various exploration and development companies, and individual mining men, to secure mining properties which possess sufficient merit to warrant development. At present all the countries of the world are being thoroughly scoured by engineers representing wealthy organizations to secure mineral-bearing ores. Thus, the Guggenheims are represented in North and South America, Africa, and other parts of the world, operating on a large scale, developing mineral deposits of various types.

The various interests seeking mineral properties can be subdivided in three classes. First: the large exploration companies, such as the Canadian Mining & Exploration Co., Guggenheim Exploration Co., United States Smelting, Refining & Mining Co., New York Exploration Co., London Exploration Co., British Venture Corporation Co., Mines Finance Co. and the Mines Selection Co. These corporations are in the business of discovering, developing and financing mining properties, and are supported financially by the wealthiest men of the world. They each possess a complete technical corps of experienced mining engineers, mining geologists and practical miners, whose purpose is to seek properties that have indications of intrinsic worth. Their field of operations is the whole world and they are amply supplied with sufficient money to undertake the development of any type of deposit, irrespective of its magnitude.

The method used by these companies for investigating the properties submitted to them is simple. They have branch offices in various parts of the world; each branch office is under the supervision of an experienced mining engineer, who is familiar with the particular section of the country in which he is operating. Under him are one or more graduates of accredited technical schools with five to ten years of experience. They are commonly known as field engineers or field scouts and their duties consist of making preliminary reports on properties and consulting with the local representative. A property reported on favorably by the field engineer is further investigated by the engineer in charge of the local office, and

*Catlin & Powell, 25 Broad St., New York.

if he be favorably impressed, the property is then brought to the attention of the main office, and is finally examined for purchase. This last examination is thorough, and on large mining operations costs, in some cases, as high as $25,000.

As a rule, a lease and bond is taken on the property, and an agreement to make periodical payments results. It is also stipulated that the company undertaking the purchase of a property shall expend a certain amount of money within a specified time to develop it. Most mining prospects are sold on this basis, and only in rare instances are outright purchases made. This occasionally happens in the case of mines which have ore blocked out and when estimates of value per ton, cost of mining and milling, and net profits can be estimated reliably.

In preparing data of a mine or prospect to be placed before one of the above mentioned companies, extreme care should be taken to provide a report on the property by a reputable mining engineer, including assay plans, maps, smelter receipts and all other data necessary in order to permit the officials of the company to decide whether the property merits further investigation. Above all, if you do not possess a property of sufficient merit to justify the utilization of their time, don't bother them, for your efforts will be given scant consideration.

The second type of seekers for mines are large operating companies, such as, for instance, the Tonopah Mining Co. and Tonopah-Belmont Development Co., of Nevada; La Rose Mining Co. and Crown Reserve Co., of Cobalt, and others too numerous to mention. They operate on the same system as large exploration companies, but to a lesser extent. Their object is to secure new mines to perpetuate the corporation and also have in view the fact that mining, when conducted on a business basis, is a profitable industry. They diminish the risk as far as possible and may expend years of effort and thousands of dollars before accepting a property for purchase. If they do purchase a good mine, they soon make up for lost time, money and effort. Out of three hundred or more properties examined by the Canadian Mining & Exploration Co. since its inception, it has not undertaken the purchase of one.

The third and last division of mine seekers consists of individuals strong enough to operate alone and a few of the more prominent are: Senator W. A. Clark, James B. Haggin, Capt. De Lamar, George Wingfield and M. J. O'Brien, of Renfrew, Ontario. These men have engineers in their employ who look up and examine all prospects and mines submitted to their attention, except in the case of Wingfield, who limits his operations to Nevada and the Western states. The others mentioned own mines in all parts of North and South America.

The statement is commonly made that money with which to finance a good mining property is difficult to secure. This is a bad mistake. Money for good, legitimate mining properties can be easily obtained from any of the above mentioned companies, but they are from "old Missouri" as a rule, and you certainly have to show them. That happens to be a difficult thing to do in ninety-nine per cent. of the cases.

The day of the rank wild-catter has passed into obscurity. Like the buffalo, he has gone to return no more. Uncle Sam, aided by the American Mining Congress, the technical publications and other forces, has made it difficult for this class of parasites to operate. If you possess good mining property, consult the nearest reputable engineer and have him assist you in communicating with capital, but remember that the principal part of the whole matter is to be sure that you have a good property before you make any efforts to communicate.

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Quicksilver Operations in Northern California

By Lewis H. Eddy*

Quicksilver production in the northern districts of California should be largely increased in the next two or three years, due to the successful outcome of experiments being made in the metallurgy of cinnabar ores. There are a number of mines that have been closed down for several years, owing more to the expensive methods employed in the treatment of low-grade ores, than to the low price of quicksilver. These mines should be reopened when it has been practically and commercially demonstrated that the concentration of cinnabar can be economically accomplished.

This demonstration has been made in the Sulphur Creek district of Colusa County in a small way by G. V. Northey, former owner of the Manzanita mine. The mine produced in the several years of operation about 2000 flasks, all of which was recovered by milling and concentration, in a plant made up of a Huntington mill, Gilpin County bumping tables and a small canvas table. When the mine was sold recently, the bumping tables were removed to the Aetna mine in Mayacmas district, Napa County, where they have been installed by Bror Soderhjelm, who is operating the mine on a lease. The ore is here ground in a cement mill. At the Oat Hill mine in the same district, the tailing dumps are the source of supply for a concentrating plant installed by R. P. Newcomb. This experimental plant requires no grinding mill. The tailing is shoveled into a trough flume, where it is washed and then screened, the pulp passing to a crosswash-type concentrating table. In the trial runs, the recovery has equaled three pounds of quicksilver per ton of tailing. The tailing dumps of the Oat Hill mine contain many thousand tons, and there are many other mines in this and other districts of the State containing dump values equal to the Oat Hill that may be worked by similar methods of concentration at very low cost.

The method applied to ores which must be crushed or ground is also capable of low treatment costs. The Wall mine, also in Mayacmas district, has a crude but effective concentration plant treating soft ore from the mine, which is crushed by a simple grinder, and the pulp goes over a table built on the principle of the Oat Hill plant, but much simpler. At this mine the concentrate is mixed with the hard ore which goes into the pipe retort furnace.

These various experimental plants are proving the principles of concentration applied to the metallurgy of cinnabar ores. There are improvements to be made, and there will arise, no doubt, metallurgical problems which will have to be solved; but the demonstrations have been sufficient to indicate the possibilities of commercial recovery of quicksilver by concentration.

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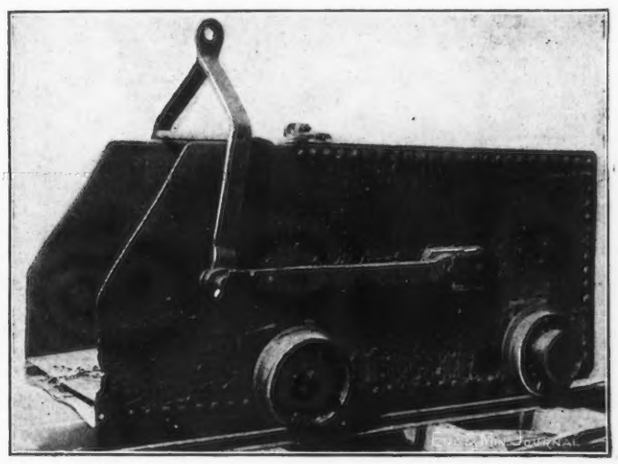
DETAILS OF PRACTICAL MINING

Jointed-Bail Skip

The skip herewith illustrated is the type in use on the slopes or inclined shafts of the Chateaugay Ore & Iron Co., at Lyon Mountain, N. Y. It differs from standard types chiefly in the fact that the bail is hinged in the middle as well as pivoted at the point where attached to the car. The reason for this lies in the extremely irregular grade of the track, which follows more or less closely the foot wall of the deposit. A one-piece bail would tend to lift the lower wheels of the skip from the track when going over a brow, that is, when a descending skip passed from a flat portion of the skipway to a steeper portion, or before an ascending skip passed from a steep portion to a flat. This would result from the rope's being forced by the roller at the brow to take a flatter angle than the track, thus depressing the bail till it rested on the stops above the upper wheels, when a certain component of the rope pull would tend to make the skip pivot about its upper wheels and lift the lower end. The possibility of this happening is obviated by the insertion of the joints at a point just above the stops. The upper portion of the bail thus is always continuous with the rope and the effect is to reduce to such a point the leverage of the lower portion of the bail on the stop that it cannot exert sufficient pull to lift the lower wheels from the track.



SKIP FOR SHAFT OF VARYING INCLINATION

Preserving Underground Survey Points

In the Cananea Consolidated, observation has shown that survey plugs driven flush with the rock of the back or slightly inside the hole are less subject to rot than when allowed to project. Protection against rot is important, not only as giving the station a longer life, but as giving more assurance to the surveyor of its not having been disturbed. A brass spad is used now in preference to those made from horseshoe nails.

When survey points have to be set in timber, especially in new timber near a face, it has been found well worth while to carry the point down from the spad in the cap to a point on the sill or on a hub in the bottom. The cap and consequently the spad is more subject to movement than the point in the bottom. Furthermore, with the point set in the floor, any movement can be readily detected.

A Drill Tester for the Shop

A device for obtaining graphically and rapidly many of the essential characteristics of rock drills without subjecting them to actual drilling tests, U. S. Pat. No. 1,062,662, has been devised by William D. Paynter, of Grass Valley, Calif., the machinist in charge of the repair and upkeep of machine drills of the North Star mine. Its general appearance with a stoper under test is shown in Fig. 1. Fig. 2 is a somewhat diagrammatic representation of the same arrangement.

The base has a pedestal bolted to its left-hand end in which a vertical pillar is clamped by a split collar.

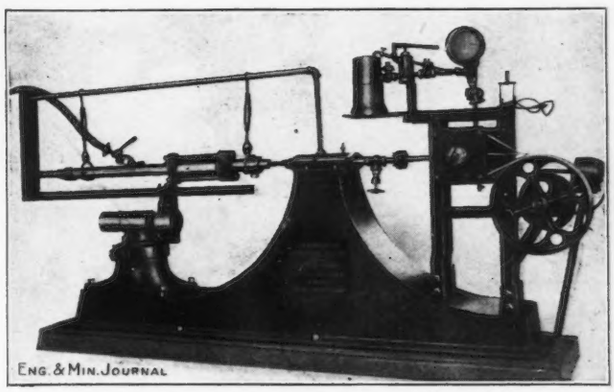


FIG. 1. THE MACHINE WITH A STOPER UNDER TEST

This pillar carries a horizontal longitudinal arm on which may be clamped an ordinary saddle for a piston or Leyner machine, or a carrier for use as a back-stop with air-feed hammer stopers. An air-feed stoper is shown suspended by hangers from a suitable support. The pillar permits vertical adjustment and the clamp gives a horizontal movement.

The central part of the base rises to carry the cylinder and plunger device as shown. One end of the plunger projects through the cylinder and against this bears a bar, which is ubstituted for the bit in the drill. The other end of the cylinder communicates with a pipe to the diaphragm chamber, carried on a framework at the right-hand end of the machine.

The diaphragm chamber is shown in more detail in Fig. 3. It consists of a plate, recessed to form a chamber which is closed with a diaphragm of highly tempered steel. This diaphragm is held under a cover ring and its motion is adjustable by studs on the inside and stop

rings in the nature of bushings on the outside. The cylinder, pipe and diaphragm chamber are filled with oil by a pump from the reservoir shown, and there is also connected with this oil system a pressure gage.

A rod is secured to the center of the diaphragm so as to move with it, and carries a spring which governs its motion somewhat. An arm called the multiplying lever is moved by this diaphragm rod, being pivoted at one end and carrying a recording pencil on its long arm. The pencil bears against the paper on a revolving drum which is driven through worm gearing by a small motor.

The feed pressure and blows of the drill are communicated to the plunger by the bar which bears against the plunger end. They are transmitted by the noncompressible oil so as to vibrate the diaphragm, the movements of which are magnified by the pencil arm and recorded on the paper of the drum. The speed of the drum is uniform and can be calibrated by the use of a pendulum. The movement of the pencil across the paper, corresponding to the strength of the blows, can be calibrated by measuring it against readings on the pressure gage.

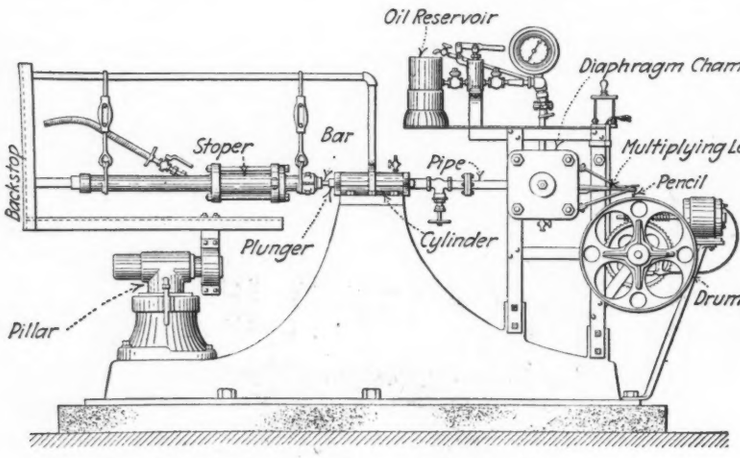


FIG. 2. ELEVATION OF THE MACHINE

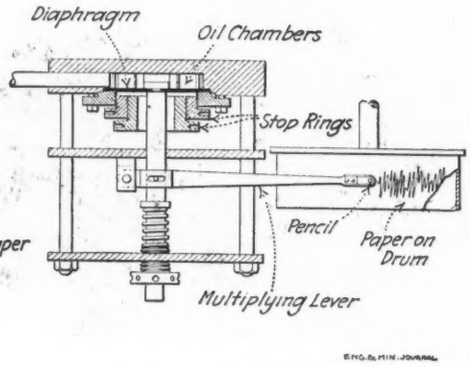


FIG. 3. PLAN OF DIAPHRAGM, RECORDING ARM AND DRUM

The method of testing is somewhat as follows: The drum with the paper on its periphery is revolved with no pressure on the diaphragm, the line *A*, Figs. 4, 5 and 6, is thus obtained. It is then revolved in the case of a stoper with the air pressure on the telescope feed, but with the hammer not moving, giving the line *P*. The drill is then allowed to reciprocate and its blows give the irregular line shown, the impact of the hammer forming the line *BC* and the return of the diaphragm, the line *CD*.

Fig. 4 represents a test on a typical stoper in which the air pressure was 100 lb., the number of blows struck was 1284 per min., and the foot-pounds developed per blow calculated to be 50. This would show a little less than 2 hp. developed. In Fig. 5, obtained from a similar machine, there will be noted a secondary blow, the cause and effect of which are not yet determined. In this case the air pressure was 96 lb., the blows per min. 1260 and the foot-pounds per blow, 40. Fig. 6 is the graph obtained from a machine in poor shape. The air pressure in this case was 84 lb., the blows per min. 1272, and the foot-pounds per blow, probably about 15. These two last mentioned machines drilling in hard rock under the same pressure, 84 lb., made 0.105 ft. and 0.051 ft. per min., respectively, thus confirming the indications of the tester. It is evident that the tester fulfills much the same function as a steam-engine indicator in giving an energy graph, valuable, however, more for its indications of condition and adjustment than for the quantitative measurements. It differs from the steam-engine indicator in measuring output rather than input.

The development of the machine grew out of the necessity of preventing defective drills from going underground. At the North Star the machines are usually taken on a truck from the shop to the shaft collar, unloaded, and loaded on a cage, unloaded again at the shaft turn, loaded on a truck to go up the main raise, unloaded at a level station, loaded in a car and taken to the top or bottom of a stope, unloaded and carried to the working face. Evidently this is a process costing money. If the machine will not drill when set up, it means a definite loss to the company, augmented by the fact that the irritated miner will work less efficiently for the rest of the shift. It was found impossible to detect the defective machines in the shop. One which might sound all right and work well when set up and run against a block would prove quite useless underground. To get a more definite line on the conditions of the drills, a simple machine, embodying the principle described, was built and this more complete and convenient device developed therefrom.

The tester has served this purpose excellently, but it also lends itself to investigation along other lines. The effects of changes in pressure, lubricant, etc., can all be investigated in this way more easily and more exactly than by actual drilling tests. A test to ascertain the effect of a difference in pressures indicated that a drop of 32% caused a drop in the strength of the blow of 31%, but a drop in speed of only 12%. Underground tests showed that a drop in air pressure of 28% gave a decrease in drilling speed of 47% with sharp steel; a pressure drop of 22% gave a drilling-speed decrease of 46% with dull steel; a pressure drop of 28% in another case gave a drilling-speed drop of only 25%.

A test with different lubricants showed that a change from heavy lubricant to medium gave an increase in blows per minute from 1116 to 1212 and of foot-pounds per blow from 25 to 34, while a change to light oil again gave increases to 1224 and 38. This test, however, was

made on a new machine and it may be that smaller differences would be found in the case of an old machine.

The statement is frequently made that excessive air consumption indicates that a drill is in bad condition. A large number of tests indicated that machines of a certain type had an average air consumption of 75 to 80 cu.ft. of free air per min. at 90 lb. pressure. A test of a machine of this type using 90 cu.ft. gave 1296 blows and 43 foot-pounds, high figures, which indicate that increased air consumption does not necessarily indicate poor condition. A further field of usefulness lies in testing out new equipment. Thus in one instance four new valves were obtained from the manufacturers and when tested in machines, one was found defective. Investigation showed a piece of steel-cutting clogging a port so as to throttle the air and reduce the strength of the blow 35 per cent.

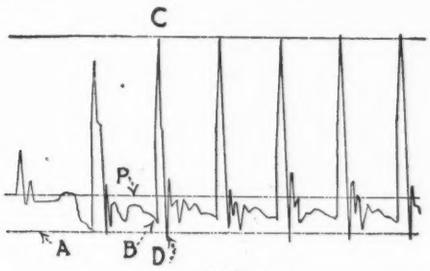


FIG. 4

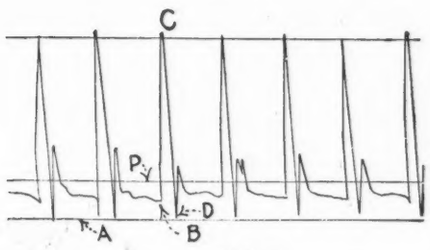


FIG. 5

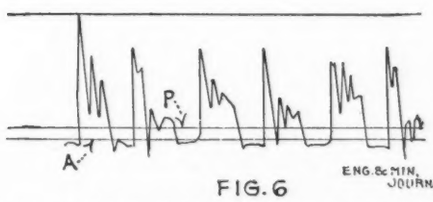


FIG. 6

TYPICAL CARDS OBTAINED WITH THE TESTER

It would seem as if one of the most extensive fields of application of the device would be in comparing drills of different makes. Many inferior types could be eliminated at once in a preliminary test on the machine and only the high-class drills reserved for further test in rock. The tester should receive a welcome both from mining companies and drill manufacturers. A mine of any size at all could well afford to install one. It is adapted to test both hammer and piston machines.

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A Simple Rule for Inflating Pneumatic Tires was given recently by the service manager of one of the tire companies, according to "Engineering News," and is applicable to tires of all sizes. According to this rule the front tires should be inflated to a pressure in pounds equivalent to 17 or 18 times their cross-section in inches and the rear tires to 20 times their cross-section, thus 34x4-in. tires should have a pressure of about 70 lb. on the front wheels, and 80 lb. on the rear.

Safety Rules—Belts, Pulleys and Shafts*

(1) Belt, rope and cable transmission shall be arranged, so far as possible, to be easily guarded.

(2) Pipe or angle railing placed 18 in. from the pulley or belt shall be provided where there is little danger of anyone's getting caught by the belt.

(3) Wire-mesh or perforated-plate casing shall be provided where the location of the belt is such that persons are liable to get caught between the belt and the pulley.

(4) Where the belt is located in such a position that, should it break, flying ends will strike persons passing by the belt, it should be inclosed by a suitable guard.

(5) The width of a belt should be allowed between two pulleys or a pulley and a hanger on shafting so as to prevent the belt from becoming wedged and possibly pulling down the line shafting.

(6) Belt splicing shall be made so as to eliminate ragged edges or projections which might catch employees' clothing. Endless belts are recommended, especially for high-speed machines.

(7) Belts should be inspected frequently and kept in a condition to avoid accidents. Tight belts should be avoided.

(8) Wherever it is necessary to shift belts a mechanical device should be provided.

(9) Where it is necessary to unship a belt, a hook or belt-perch should be provided to prevent the belt from resting on the shaft.

(10) Shafting not over 12 in. above floor should be covered.

(11) Shafting over 12 in. and not over 7 ft. above floor should be encased or railed off.

(12) Exposed ends of shafting shall be encased or otherwise guarded.

(13) Overhead shafting which must be oiled should be equipped with a walk for the oiler, if practicable.

(14) Electrically driven shafting should be provided with a safety switch, to be used when men are working on it. This switch should be placed at the top of the ladder or in some place where no one will tamper with it.

(15) Shaft couplings should be guarded where safety coupling is not used.

(16) To prevent gears or pulleys from working off the ends of shafting, shaft ends shall project at least the diameter of the shaft beyond the hub of the gear or pulley, so that the key can be locked in place.

(17) Hangers for shafting shall be particularly strong and well secured.

(17) All projecting keys in shafting when exposed so that a person might get caught thereon, shall be guarded or cut off.

(19) Wherever possible, cotter pins or spring washers should be provided to prevent nuts from working off the ends of bolts.

(20) Setscrews must be guarded, countersunk or placed in safety collar with flanges high enough so that the setscrew head will not project above the flange.

(21) Because of the dangers incident to hoisting material by means of line shafting, it is forbidden that any

*From Inland Steel Co.'s book of rules.

hoisting be done in this manner. All hoisting shall be done either with hand tackle and block, or with regular hoisting machinery.

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Tramming System, Mount Royal Tunnel

The manner of handling the muck cars in the face of a typical heading of the Mount Royal tunnel, Montreal, is outlined in *Mine & Quarry,* July-August, 1913. After the blast, cars 1 and 2 of the illustration are pushed in by the men as they go to their positions, and are set on the two tracks as shown, 2 being a little bit back of 1 in order to give the muckers sufficient room to swing. Car No. 1 is loaded first. Before 2 is loaded, one of the two storage-battery locomotives which are used, has brought in cars 3 and 4, which it couples to car 1, runs back to the near switch, ushes up and couples to car 2. It then returns the empties 3 and 4 to the track from which 1 was taken, picks up 1 and 2, and proceeds with

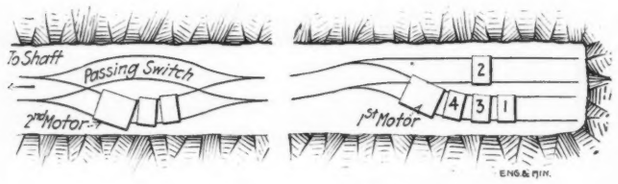

Diagram of Method of Handling Cars

them to the shaft. Car 4 is pushed back to the switch and ahead again on the other track by a man called the car wrangler, so that 3 and 4 now occupy the positions in which 1 and 2 were first shown. The second locomotive, which has passed the first locomotive at a siding about midway between the face and the shaft, now comes in with two more empties and repeats the operation. By this system no time is lost by the muckers in waiting for cars. The spur track is changed frequently, so as to reduce the switching distance necessary.

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The Dead Load of Hoisting

Extensive tests and measurements were made in various Butte shafts by Nordberg engineers, preliminary to the installation of new hoisting machinery. The figures obtained show the importance of dead loads in hoisting. From the descriptive article published in the A. I. M. E. Bulletin for September, it appears that the weight of the Speculator round rope was 4800 lb., while the flat ropes at the Diamond, High Ore and Mountain View shafts weighed 10,700 lb. each, these weights covering a depth of 1800 ft. The skips and cages in each case weighed 11,000 lb., and the normal load of ore was 10,000 lb., except at the High Ore, where it was 8000 lb. The ratio of dead load to useful load is, therefore, for the Speculator, 1.58; for the Diamond, 2.27; for the High Ore, 2.84; and for the Mountain View, 2.27. These are greater than in average hoisting practice, inasmuch as in Butte the cage is permanently attached to the skip, and for great depths flat ropes become exceedingly heavy. The magnitude of the dead loads is an important factor in the mechanical efficiency of hoisting operations, since it influences the friction and the dynamic energy that has to be supplied during acceleration and released during retardation. This dynamic energy is lost in the form of heat on the brake shoes ordinarily. The difference in the weight of the round and flat ropes is noteworthy. Ordinary figures do not give such a wide variation in the weights of the two types used to handle the same load. This additional weight of 2½ tons for a flat rope having the same live load is a strong count against this type. Their easy inspection where corrosion is rapid is the main argument in favor of flat ropes, although reels offer advantages from the point of view of lightness.

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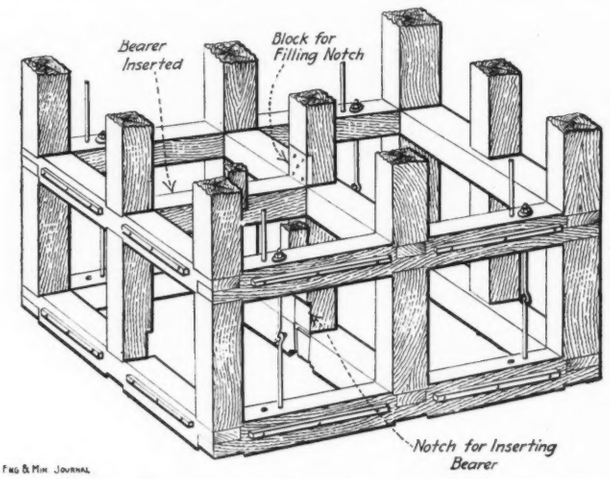
Delayed Placing of Shaft Dividers

When sinking through soft or heavy ground in Butte, it is necessary to keep the last set close to the bottom of the shaft. In such case the muck fills almost to the timbers, and mucking becomes awkward (A. I. M. E. Bulletin, August, 1913). In such cases it is customary to omit one of the dividers in the bottom set. An area 2 in. deep is cut from the post just above the plate and when a new set is placed, the divider of the set above is pushed into this opening and hammered down into



Set Showing Divider Omitted for Later Placing

place. The 2-in. opening is then filled with a block. The method of doing this is shown in the accompanying illustration, which, it should be noted, however, is not the typical arrangement for a Butte shaft-set.

In case a guide girt is used, which is really an auxiliary divider used to give support to the guide, this also can be omitted and put in from the side at the same time that the divider proper is inserted, being then wedged and allowed to become solid from the side weight of the shaft. In case a guide post is used and is framed into the divider with a mortise and tenon, the divider cannot be inserted in this manner. It is then framed with straight sides and pushed up from the bottom, being held in place by the posts of the set below. This method makes the framing cheaper and is sometimes used where the mortise and tenon guide post is not installed. It is, however, inferior to the first mentioned method. When the wall plates of a shaft have been pushed in so that the divider is hard to set, they can be spread with a small bar of 3-in. pipe with a screw end similar to that used for machines.

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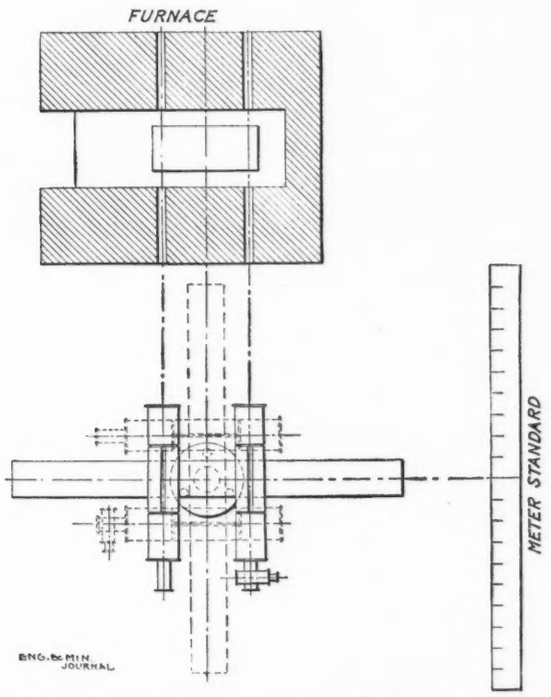
The Murex Magnetic Process (cf. "Eng. and Min. Journ.," Dec. 7, 1912) has been in operation at Clausthal on the mixed ores of blende and galena for some time and the results are said to give satisfaction.

DETAILS OF METALLURGICAL PRACTICE

Testing Firebrick for Use in Coke Ovens

A description of apparatus used by Baron Coppée for measuring the expansion of firebricks is given in the *Iron and Coal Trade Review*, Sept. 26, 1913.

The apparatus consists of a furnace for heating the bricks, a cathetometer for observing the expansion, and a standard meter scale for measuring the amount of the expansion, together with the necessary thermometers and pyrometers for taking the temperature readings. The cathetometer is of a horizontal type, composed of a metal bar mounted on a central pivot and carefully adjusted, so as to be capable of being rotated in a true horizontal plane. The bar carries two sighting telescopes, fitted



ARRANGEMENT OF APPARATUS FOR TESTING FIREBRICK

with fixed vertical and horizontal cross-wires. One of the telescopes is fitted in addition with a movable vertical cross-wire, attached to a delicate micrometer screw. The telescopes can be moved along the bar in a horizontal direction and are fixed by clamps.

The furnace is of suitable size to hold bricks up to 10 in. long. For temperatures up to 1000° or 1100° C. the furnace is heated by gas, but for higher temperatures than this a gasoline blow-pipe is brought into use. Two small openings are made in the side wall of the furnace at a distance apart which is slightly less than the length of a brick. The standard meter scale is of H section, made of "Invar" metal, divided into millimeters, and is exact to within 0.01 mm. Temperatures are measured by mercury thermometers and pyrometers of Le Châtelier, Féry and Wanner types.

By means of an ordinary saw and emery powder, cuts about 5 mm. in depth are made on the face of the brick, not less than 1 cm. from each end. A thick platinum wire is then fixed in each cut, so that the ends of the wires, which are finely pointed, project some 2 or 3 mm. above the end of the cut. The brick is placed in the furnace so that the points of the platinum wires are visible through the openings in the side wall of the furnace. The cathetometer is placed at a distance of about 1.5 m. from the brick, and its bar is adjusted so that the horizontal cross-wire of each telescope is on a level with the top surface of the brick. The telescopes are focussed on the platinum points and then adjusted so as to bring the platinum points exactly on to the fixed vertical cross-wires of each telescope. This fixes the distance between the platinum points, which distance has next to be read on the standard meter scale. For this purpose, the scale is placed at right angles to the cathetometer, and at a distance from it equal to the distance between the cathetometer and the brick. On turning the cathetometer through 90° degrees the cross-wires are brought on to the scale, and it remains to read the distance between them, which is done in the usual way in which a cathetometer with micrometer eyepiece is used.

The furnace is then heated up and similar readings are taken every 100° up to 1400° or 1500°. The complete results are plotted as a curve whose coördinates are the temperature and the distance between the platinum points, respectively.

Results are accurate to about one part in 22,000.

Improving Arsenical Copper

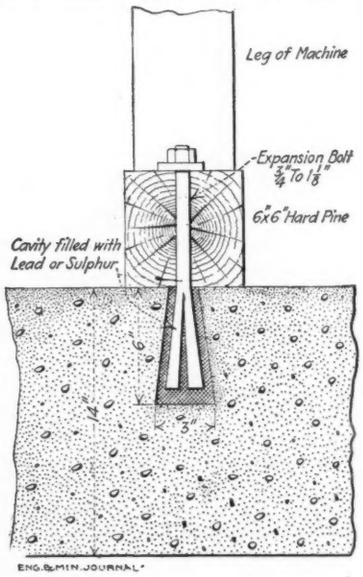
In a paper before the Institute of Metals, at the Ghent meeting, F. Johnson records the results of an investigation of the properties of specially alloyed arsenical copper with a view to proving its suitability for use as locomotive stay-rods, wire for rivet manufacture, and any material required to have specially high malleability, ductility and toughness combined with tensile strength and resistance to reducing gases at high temperatures. An improvement in quality in these respects has been obtained by adding silicon and iron to the copper in various small proportions. When added to the copper in the form of a copper-silicon-iron alloy (of low melting point) complete deoxidation is effected, and, in addition is so thorough that perfectly sound ingots are obtained. In the absence of bismuth and other like impurities which cause red shortness in deoxidized copper, the ingots behave perfectly when rolled at a bright-red heat, even if silicon and iron are present together in considerable excess of the amount required for deoxidation. It is shown that silicon is a more efficient deoxidizer than iron, but that iron has a greater strengthening effect than silicon. Complete analyses of the rolled bars have been made, and it is noteworthy that the added elements confer greater toughness than is possessed by "tough-pitch" copper containing oxygen and a

similar quantity of arsenic. Heat treatment of the experimental bars in a reducing atmosphere also proves their immense superiority over "tough-pitch" arsenical and nonarsenical bars. The experiments have been backed up by works' tests on a larger scale. Tensile tests at the temperature of high-pressure steam show that the specially alloyed bars are in no way inferior to "tough-pitch" copper of similar arsenic contents. The above mentioned improvements have not been gained at the expense of any of the properties considered to be essential in commercial "tough" copper for locomotive stay-rods. Certain physical characteristics of the experimental bars are revealed and differences in behavior explained by the aid of the microscope.

Attaching Machinery to Concrete Floors

The problem of fastening machinery to concrete floors easily and economically is always of interest, says John S. Nicholl, in the *American Machinist,* Oct. 9, 1913, and the following method may prove of value.

The machines in question weighed about one ton each and were run at such a speed as to cause injury to the



ATTACHING MACHINERY TO CONCRETE FLOOR

concrete unless all vibration were absorbed. No provision for attaching the machines was made in the original design.

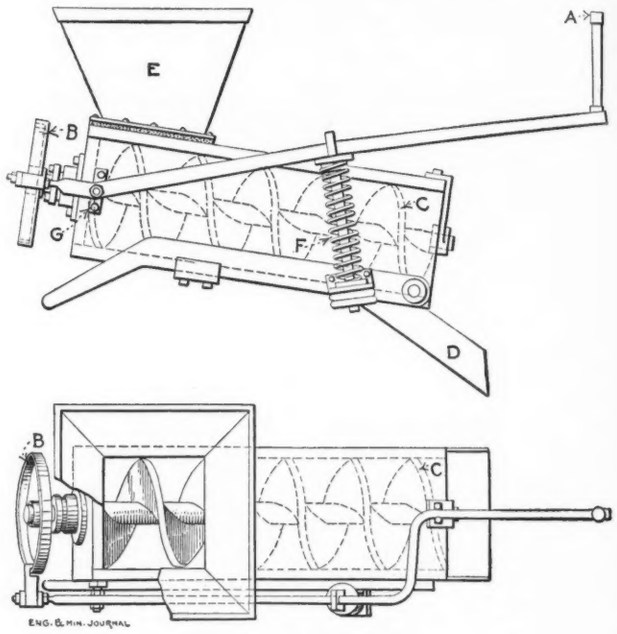
The owners therefore decided first of all to sink holes 6 in. deep and 3 in. wide, tapering at the top. This was done with an air drill.

Expansion bolts were then put into the cavities and were held in place by pouring in lead, the latter serving as a cushion. The machines were fastened to 6x6-in. hard pine beams, nuts with washers being used. In place of lead the manufacturers have used sulphur, but not with such good results. In cases where the vibration was excessive ¼-in. sheets of rubber were placed under the beams with good results.

The owners report that the vibration of the machine has now been taken care of, all the machines operating satisfactorily on the concrete floors without any liability of damage.

New Feeder for Stamp Mills

A feeder for stamp mills, which operates on a principle somewhat different from the usual one, has been designed by Thomas Sutton, of California, and patented under U. S. No. 1,047,589. Its operation is apparent after consideration of the accompanying drawing. The movement is imparted at *A* by the tappet and communicated by the lever, pivoted at *G* to the wheel *B,* which is grasped by a plain wrench grip. This allows free movement in



STAMP-MILL FEEDER

one direction but carries the wheel with it in the other. Fixed to the shaft of the wheel is a spiral screw *C,* which moves with it, taking the ore from the hopper *E* and delivering it to the spout *D,* which leads into the mortar. A spring *F* returns the lever to the normal position after having been depressed by the tappet. The device is simple, has few parts to get out of order, and appears entirely practical.

Galvanizing with the Aid of Mercury

A description by Consul General William Dawson of a German method of securing adherent deposits of zinc in galvanizing is given in "Mineral Resources of the United States for 1912."

After steeping in sulphuric acid the iron is placed in a solution of mercuric chloride and then heated, resulting in a decomposition of the mercuric chloride and precipitation of metallic mercury, which forms an amalgam of iron on the surface. The iron is then plunged into a zinc bath heated to 500°, where it remains three minutes.

Iron galvanized by this process usually shows strong adhesion of coating to metal. Microscopic investigation shows that the zinc penetrates into the pores of the iron, and in case a portion of the coating is worn or broken off iron does not rust, owing to the presence of sufficient zinc in the pores to prevent corrosion. The mercury is, of course, lost.

THE ASSAYER AND CHEMIST

Salting Assays by Salted Cupels

By Donald M. Liddell*

The following experiments were made to test the possibility of salting assays through cupels which had previously been salted, either intentionally or otherwise. Bone-ash cupels, 1 in. in diameter, were treated with silver-nitrate solution. After drying, the outside of the cupels gave no indication of the presence of silver salts, but inside the cupel depression, the surface invariably showed a deep purple color, indicating precipitation of insoluble silver salts by the bone ash. The first experiments were made using varying quantities of silver (as nitrate), first in 1 c.c. of solution, then in 2 c.c. With 1 c.c. about two-thirds of the cupel became gradually wet; with 2 c.c., the entire cupel. The cupels were then dried, and 20 grams of test lead cupeled in each one under usual commercial conditions.

To test whether different results would follow, if there

RESULTS WITH 1 C.C. OF SOLUTION

Silver contained in solution	40 mg.	20 mg.	10 mg.
Silver recovered by cupellation	2.89 mg.	2.49 mg.	2.00 mg.

RESULTS WITH 2 C.C. OF SOLUTION

Silver contained in solution	40 mg.	20 mg.	10 mg.
Silver recovered by cupellation	2.50 mg.	2.26 mg.	1.82 mg.

were silver originally present in the buttons, that is, to see whether this silver would pick up any additional amounts from the cupel, the experiments were repeated, using 10 mg. of pure silver and 20 grams of lead. Check cupellation of 10 mg. pure silver with 20 grams lead in untreated cupels, gave beads weighing 9.95 mg. and 9.98 mg.

1 c.c. solution contained: Ag	40 mg.	20 mg.	10 mg.
Weight of Ag beads from cupelling 20 grams of pure lead and 10 mg. pure silver in salted cupel	12.85 mg.	12.46 mg.	12.05 mg.
Deduct check obtained by cupelling 20 grams lead and 10 mg. Ag	9.95 mg.	9.95 mg.	9.95 mg.
Gain	2.90 mg.	2.51 mg.	2.10 mg.
2 c.c. solution containing: Ag	40 mg.	20 mg.	10 mg.
Weight of Ag beads from cupelling 10 mg. pure Ag and 20 grams. Pb. in salted cupel	12.51 mg.	lost	11.80 mg.
Check—10 mg. pure Ag and 20 grams Pb	9.98 mg.	.....	9.98 mg.
Gain	2.53 mg.	.....	1.82 mg.

All these results are of the same order and point to the conclusion that during cupellation, lead absorbs silver from cupels containing it, but only from the surfaces with which it comes into immediate contact. It is also apparent that most of the silver contained in the solutions used was precipitated in the upper part of the cupels at or near the surface and not carried throughout the body of the cupels by the solution. This was confirmed by treating a 1-in. cupel with 80 mg. of silver (as nitrate) in 2 c.c. of solution; the whole cupel was gradually wetted by the solution. On cutting the cupel in half horizontally, the lower portion, although it was well moistened by the liquid, contained no silver and the upper portion, consisting of the upper ½-in. section, contained all of the silver.

I thank Ledoux & Co., of New York, in whose laboratory the above experiments were made; and to acknowledge the suggestions of its staff as to variations of the original scheme.

*Associate editor, "Engineering and Mining Journal."

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Benzoic Acid as Standard Material

The extended use of benzoic acid as a calorimetric standard, and its value as an acidimetric standard, makes it appear desirable to call attention to the fact that the substance is slightly hygroscopic, according to an article by E. R. Weaver, of the Bureau of Standards, Washington, D. C., in the "Journal of the American Chemical Society," September, 1913. Mention of the subject has been made in the Journal, Aug. 17, 1912.

Definite data on this point were first obtained when comparing, by means of titration with a standard alkali, the samples *B* and *C* described below. The following samples were then examined: Sample *A* was especially prepared to be used as a standard for comparison by starting with the purest material obtainable commercially, and successively crystallizing from alcohol and from water, subliming in vacuo, again crystallizing from water and again subliming twice in vacuo over fused calcium chloride. The object of the double sublimation at the end was the removal of the last trace of water. Sample *B* was some of the material purified by Morey[1] and kept for more than a year in a glass-stoppered bottle. Sample *C* was a commercial product of good quality, but shown to contain a small amount of impurity by the ash left upon ignition.

The acidity of the samples having been determined, a portion of each was carefully fused and the acidity again determined. The average results follow, taking the average value obtained for *A*, as 100%.

Sample	Number of Determinations	Average Per Cent.
A	7	100.00
A fused	5	100.00
B	6	99.93
B fused	9	100.01
C	6	99.95
C fused	5	99.96

The results obtained with each sample were concordant. One series, the results obtained upon sample *A* before fusion, gave 100.01, 100.02, 99.98, 100.00, 100.00, 99.98, 99.99. This fairly represents the agreement between results from any one sample.

While these titrations indicated that sample *B* had taken up during the year about 0.07% of moisture, it seemed desirable to prove the presence of water in the sample in a more direct manner. This was done by dissolving a little of each of the samples in ethyl acetate, which was shown by a blank test, made in the same way as the final test, to be nearly anhydrous; shaking with calcuim carbide, and decanting the liquid into an ammoniacal solution of cuprous chloride. This test, which is being investigated as a general method for the detection of traces of water, depends upon the formation of acetylene, which dissolves in the organic solvent used, in this

[1]Journ. Am. Chem. Soc., Vol. 34, p. 1027.

case ethyl acetate, and is precipitated upon adding to cuprous-chloride solution. The test was repeated several times, using ethyl acetate and other organic solvents, and showed clearly the presence of water in sample *B* and of a smaller amount in sample *C*. Several other old samples of benzoic acid showed the presence of a little water when subjected to the same test. That moisture is not taken up rapidly by the acid is shown by the fact that no change could be noted in sample *A*, after it had been freely exposed to the air of the room at intervals, during compression into pellets and handling in other ways. Numerous calorimetric tests on different samples made from time to time in the heat laboratories of the Bureau have shown no systematic differences exceeding 1 part in 2000, which could be attributed to moisture variations.

Fortunately, in order to remove the absorbed moisture from benzoic acid, it is only necessary to fuse it; but this must be done with great care or else a change takes place with the formation of a brown, resinous substance. The fusion may be made in a loosely stoppered Erlenmeyer flask in an air bath. The fused mass may usually be broken up easily without breaking the flask. A temperature higher than 130° should be avoided.

No effort was made to learn the exact nature of the change, which takes place upon heating. It goes on quite rapidly when the temperature is raised to more than 150°. A portion of sample *A*, which had been heated to 150°-160° for half an hour, showed an acid value of only 99.93%, as compared with the standard. It has not been found practicable to sublime the acid without the formation of a little of the brown compound. A small amount of residue was left in the platinum dish after each of the sublimations carried out in the preparation of sample *A*, and as this residue is volatile only at a much higher temperature than that occurring during sublimation, and was found to be present in about as large quantity after the third sublimation as after the first, some of it must have been formed during sublimation. In the sublimation apparatus used for the preparation of standard benzoic acid on the large scale, a small amount of the acid condenses upon the inside of the glass cylinder supporting the electric hotplate. It remains here day after day at a temperature somewhat elevated, but lower than the melting point. Under this condition it gradually turns yellow, showing that the resinous compound is slowly formed at a temperature even below the melting point. When the acid is fused to remove moisture, it should, therefore, be kept at as low a temperature as possible and not allowed to remain any longer than is absolutely necessary. It should remain perfectly colorless after fusion. Any amount of decomposition which can be detected chemically imparts a distinct yellow color to the fused mass.

Determination of Zinc in Ores

By means of the following method, zinc may be determined by Low's ferrocyanide process (*Journ. Ind. Eng. Chem.*, p. 302, 1913), no matter what impurities may be present. One gram of the ore is dissolved in aqua regia, treated with 1 gram of potassium chlorate, evaporated to dryness, the residue treated with 50 c.c. of water and 0.5 gram of potassium hydroxide, and then heated nearly to boiling for several minutes with 6 grams of ammonium carbonate, whereby iron, aluminum, manganese, lead and cadmium are precipitated. The precipitate is filtered off, washed with a hot 5% solution of ammonium carbonate, then dissolved in hydrochloric acid, with a little potassium nitrate, the solution neutralized with potassium hydroxide, and reprecipitated with ammonium carbonate, the precipitate being washed as before. The filtrates and washings contain copper and zinc. The copper is precipitated as sulphide, and the zinc determined by titration with ferrocyanide, using uranyl nitrate on a spot plate as indicator.

Melting Points of the "Iron Group"

Some recent determinations of the elements with atomic weights from 48 to 59 were reported by G. K. Burgess and R. G. Waltenburg to the Washington Academy of Science. These new values should be used rather than those in the JOURNAL of Aug. 17, 1912, p. 293.

The determinations were made mainly with the micropyrometer, the metals being melted in hydrogen, usually on platinum strips (manganese also on nickel strips, and titanium on iridium strips). In some cases the metals were melted in crucibles in an Arsem electric furnace, and the melting point determined by the method of optical heating and cooling curves (Tech. Paper 10, Bureau of Standards). The results are summarized in the following table:

Metal	M.Pt. with Micropyrometer ° C.	Purity of Metal %	Probable M.Pt. of Pure Metal ° C.
Nickel	1452* 1449†	99.83$_6$	1452 ± 3
Cobalt	1477 ± 2 1478 ± 1‡	99.95$_1$	1478 ± 5
Iron	1533 ± 1§ 1528†	99.98 ± 0.01	1530 ± 5
Manganese	1255	97-98	1260 ± 20
Chromium	1520	98-99	1520 to >Fe
Vanadium	1720	97-98	1720 ± 20
Titanium	1794 ± 12	99.9+	1795 ± 15

* Assumed value on platinum strip; observed value on iridium strip.
† Crucible melts in Arsem furnace.
‡ Crucible melts in Arsem furnace; also on iridium strip with micropyrometer.
§ Five samples all agreeing to within 3°.

New Reaction for Molybdenum

P. Melikoff, a Russian chemist, has proposed a reaction for molybdenum, which consists in the formation of ammonium permolybdate $(NH_4)_2.MoO_4.H_2O_2$ (*Chem. Zeit.*, Aug. 9, 1913). In order to prove the presence of molybdenum in a substance, its solution is evaporated to dryness on the water bath; after cooling, a drop of strong ammonia and as much hydrogen peroxide are added to the residue. If molybdenum be present, a cherry-red to pinkish-yellow color, according to the amount of molybdenum, will instantaneously make its appearance. Komarowsky, another Russian chemist, has compared this reaction with the one produced by concentrated H_2SO_4 and finds it fully equal, if not superior, to the latter, since it never fails, which cannot be said of the sulphuric-acid reaction. By gently heating the ammonium permolybdate it is destroyed as such and the original substance regenerated. This is another advantage, as the quantity of substance used for qualitative test is not lost, but can be used quantitatively for the molybdenum determination, or for the qualitative test for any other element or radical, if only small quantities are at disposal. Komarowsky has determined the limit of sensitiveness to be at 0.006 mg. per liter.

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23,445—REDUCTION WORKS—The Great Falls Reduction Works. (Eng. and Min. Journ., Oct. 11, 1913; 1¾ pp., illus.) From a pamphlet issued by Anaconda Copper Mining Co., with some additional notes. 20c.

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GOLD AND SILVER—GEOLOGY

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23,611—RESCUE WORK—National Mine-Rescue and First-Aid Conference, Pittsburgh, Penn., Sept. 23-26, 1912. Herbert M. Wilson. (U. S. Bureau of Mines, Bull. 62, 1913; 74 pp.)

23,612—RESCUE WORK—Recovery Work at the Cadeby Main Collery. S. J. Bridges. (Iron and Coal Tr. Rev., Aug. 8, 1913; 1 p., illus.) 40c.

23,613—SHAFT LINING—Relining No. 2 Hamilton Shaft. (Eng. and Min. Journ., Oct. 11, 1913; 3 pp., illus.) From paper by S. W. Tarr before Lake Superior Min. Inst. 20c.

23,614—SHAFT STATION—Concrete Station at Champion Mine. (Eng. and Min. Journ., Oct. 4, 1913; 1 p., illus.) 20c.

23,615—SHAFT STATION—Station Suspended in a Circular Shaft at Rayas Mine. Douglas Muir. (Eng. and Min. Journ., Oct. 4, 1913; ¾ p., illus.) 20c.

23,616—SIGNALING—Evolution of an Electric Signal System. George A Packard. (Eng. and Min. Journ., Oct. 18, 1913; 1½ pp., illus.) 20c.

23,617—STEEL in Mine Construction. Carl Scholtz. (Colliery Engr., Aug., 1913; 2¼ pp., illus.) 20c.

23,618—SURVEYING—The Specification of a Precision Theodolite and Some Considerations on the Specification of Theodolites for Mines. (I. M. M., Bull. 108, Sept, 1913; 34 pp.) Author's reply to discussion of paper previously indexed.

23,619—TASMANIA—The Progress of the Mineral Industry of Tasmania for the Quarter Ending 31st March, 1913; W. H. Wallace. (John Vail, Govt. Printer, Hobart, Tasmania; 27 pp.)

23,620—TIMBERING in the Butte Mines. B. H. Dunshee, (Bull. A. I. M. E., Aug., 1913; 11 pp., illus.) 40c.

23,621—TUNIS—Apercus Statistique et Economiques sur l'Industrie Extractive dans la Régence de Tunis. Louis Berthon. (Bull. Soc. de l'Ind. Minèrale, Sept., 1913; 19 pp.)

23,622—UNWATERING the Frisco Mine, Wallace, Ida. N. S. Greenfelder. (N. W. Min. and Met., July, 1913; 1¼ pp.) 20c.

23,623—VENTILATION—Versuche mit Druckluftstrahlapparaten und Ventilatoren zur Sonderbewetterung. Dobbelstein. (Glückauf, Sept. 27, 1913; 7 pp., illus.) Experiments with compressed-air-jet apparatus and fans for special ventilation. 40c.

23,624—VENTILATION AND DUST PREVENTION—Methods of Ventilation and Dust Prevention Employed in Witwatersrand Mines. (So. Afr. Eng., Sept., 1913; 3⅛ pp.) 40c.

MINING LAW

23,625—CLAIM LINES—Ueber die Begrenzung von Längenfeldern. A. Arndt. (Glückauf, Sept. 20 and 27, 1913; 8 pp.) On end lines of longitudional claims. 40c.

23,626—LEASING of Mineral Lands, The. William Griffith. (Am. Min. Congress, Nov. 25-29, 1912; 3½ pp.)

ORE DRESSING—GENERAL

23,627—BUCKET ELEVATORS—Wet Bucket Elevator Design. Arthur O. Gates. (Eng. and Min. Journ., Oct. 18, 1913; 3 pp., illus.) 20c.

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23,630—FLOTATION—Procédés de préparation mécanique des Minerais par flottage. G. Bousquet. (Bull. Soc. Ing. Civ. de France, June, 1913; 13 pp., illus.)

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23,634—CORROSION—The Micro-Chemistry of Corrosion. Part I, Some Copper-Zinc Alloys. Cecil and Samuel Whyte. (Advance Copy, Brit. Inst. of Met., Aug., 1913; 22 pp., illus.)

23,635—FLOW OF HEAT through Furnace Walls; the Shape Factor. Irving Langmuir, E. Q. Adams and G. S. Meikle. (Advance copy, Am. Electrochem. Soc., Sept., 1913; 29 pp., illus.)

23,636—FLUE SYSTEM—The Great Falls Flue System and Chimney. C. W. Goodale and J. H. Klepinger. (Bull. A. I. M. E., Aug., 1913; 76 pp., illus.)

23,637—GAS MEASUREMENT—Neue Messgeräte für Druck und Geschwindigkeit von Gasen und Dämpfen H. Lütke. (Stahl u. Eisen, Aug. 7, 1913; 3 pp., illus.) New measuring tools for the pressure and velocity of gases and vapors. 40c.

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23,639—HYGIENE—Zur Hüttenhygiene. W. Hanauer. (Oest. Zeit. f. B. u. H., Aug. 9 and 16, 1913; 3 pp.) 80c.

23,640—METALLOGRAPHIC TESTING. (U. S. Bureau of Standards, Circular No. 42, 1913; 16 pp.)

23,641—NORTH AMERICA—Eine Exkursion auf nordamerikanische-mexikanische Blei-Zink- und Kupferhütten. Heberlein. (Metall u. Erz, Aug. 30, 1913; 9¼ pp., illus.) An excursion to North American and Mexican lead, zinc and copper works. 40c.

23,642—REFRACTORIES—A Note on the Occurrence and Manufacture of Refractories in Montana. W. H. Gunniss. (Bull. A. I. M. E., Sept., 1913; 2 pp.)

23,643—SMELTER SMOKE—Common Sense of the Fume Question. Herbert Lang. (Min. and Sci. Press, Aug. 30, 1913; 4 pp.) 20c.

23,644—SMOKE STACK—Wrecking the Balaklala Stack at Coram, Calif. (Eng. and Min. Journ., Oct. 11, 1913; 1 p., illus.) 20c.

23,645—TEMPERATURE MEASUREMENT—Modern Methods of Measuring Temperature. Robert S. Whipple. (Engineering Aug. 1, 1913; 7½ pp., illus.) Paper before Brit. Instn. of Mechan. Engrs., July 29, 1913. 40c.

FUELS

(See also "Petroleum and Natural Gas.")

23,646—BROWN COAL—The Production and Use of Brown Coal in the Vicinity of Cologne, Germany. Charles A. Davis. (U. S. Bureau of Mines, Tech. Paper 55, 1913; 15 pp.)

23,647—GASES — Entgasungsöfen und Mischgasbetrieb. Trautwein. (Feuerungstechnik, Aug. 15, 1913; 2 pp.) Gas-extracting ovens and the use of mixed gases. 40c.

23,648—INTERNAL COMBUSTION ENGINES—Fuel and Lubricants for Internal Combustion Engines. B. H. Arnold. (Gen. Elec. Rev., Oct., 1913; 5¼ pp.) 40c.

23,649—LIGNITE as a Fuel for Gas Producers. G. W. Muench. (Power, Sept. 9, 1913; 1 p.) 20c.

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23,651—OIL FUEL—L'Application du Chauffage a l'Huile Lourde aux Fours Métallurgiques. M. Brasseur. (Rev. de Met., Aug., 1913; 8 pp.)

23,652—PEAT—The Production of Peat in 1912. Charles A. Davis. (Advance Chapter from Mineral Resources of the U. S., 1912; 7 pp.)

23,653—UTILIZATION OF COAL—The Proper Utilization of Coal, and Fuels Derived Therefrom. (Colliery Guardian, Sept. 19, 1913; 3⅞ pp.) Discussion by H. E. Armstrong, G. T. Beilby and others before the British Association. 40c.

MINING AND METALLURGICAL MACHINERY

23,654—ACCIDENTS — Preventing Accidents from Machines. Frank H. Kneeland. (Coal Age, Oct. 4, 1913; 3½ pp., illus.) Illustrated descriptions of safety devices for ventilating fans, hoists, generators, etc. 20c.

23,655—BOILER WATER—Das Verhalten der kieselsäurehaltigen natürlichen Wässer in Dampfkesseln. Goldberg. (Zeit. d. Vereines Deutsch. Ing., Aug. 23, 1913; 1 p.) Behavior of silica bearing natural waters in steam boilers.

23,656—CENTRAL POWER STATION WORKING, with Special Reference to De Beers Central Power Station. (Journ. So. Afr. Instn. of Engrs., Aug., 1913; 28½ pp., illus.)

23,657—CONVEYING MACHINERY—Portable Loading and Conveying Machinery. Descriptions of a Number of Recent German Constructions. (Ind. Eng., Sept., 1913; 3½ pp., illus.) 20c.

23,658—CONVEYORS—Spiral or Screw Conveyers. Reginald Trautschold. (Can. Engr., Sept. 4, 1913; 4½ pp., illus.) Second of a series of articles. 20c.

23,659—DRIVING MACHINERY—Ueber Antriebsfragen in Hüttenwerken. G. Stauber. (Stahl u. Eisen, Aug. 14 and 21, 1913; 14 pp., illus.) On the question of driving machinery in metallurgical works. 60c.

23,660—GAS ENGINES—Ueber Ausspülverfahren bei Gasmaschinen. A. Nolte. (Stahl u. Eisen, Aug. 7, 1913; 6½ pp., illus.) On flushing methods for gas engines. 40c.

23,661—GAS PRODUCERS—Utilization of Waste Heat of Gas Producers. (Gas Age, Aug. 1, 1913; 2 pp., illus.) Translated from "Journ. f. Gasbeleuchtung," June 21, 1913. 20c.

23,662—GASOLINE-ENGINE TROUBLES and Their Symptoms. A. L. Brennan, Jr. (Power, Sept. 23, 1913; 1 p.) 20c.

23,663—HYDRO-ELECTRIC DEVELOPMENT in Montana. Hax Hebgen. (Bull. A. I. M. E., Aug., 1913; 27 pp., illus.)

23,664—INTERNAL COMBUSTION ENGINES—Fuel and Lubricants for Internal Combustion Engines. B. H. Arnold. (Gen. Elec. Rev., Oct., 1913; 5¼ pp.) 40c.

23,665—LAMPS—Portable Electric Mine Lamps. H. H. Clark. (U. S. Bureau of Mines, Tech. Paper 47, 1913; 13 pp.)

23,666—LAMPS—The Use and Care of Miners' Safety Lamps. James W. Paul. (U. S. Bureau of Mines, Miners' Circular 12, 1913; 16 pp.)

23,667—LOCOMOTIVES—Gasoline Mine Locomotives. Carl Scholz. (Colliery Engr., Oct., 1913; 1½ pp.) 40c.

23,668—MINE-CAGE LOADING — Maschinelle Beschickungsvorrichtungen für Förderkörbe. Wintermeyer. (Glückauf, Aug. 16, 1913; 5 pp., illus.) Mechanical devices for loading mine cages. 40c.

23,669—MOTOR TRUCK in Contracting and Construction Work. Rollin W. Hutchinson, Jr. (Eng. Mag., Oct., 1913; 18 pp., illus.) Second of a series of articles dealing in present installment with road making and paving. 40c.

23,670—MOTOR TRUCKS—Availability of Motor Trucks for Mines. (Eng. and Min. Journ., Oct. 18, 1913; 3¾ pp.) Information compiled from experiences of actual users. 20c.

23,671—PUMP—A New Centrifugal Pump with Helicoidal Impeller. C. V. Kerr. (Journ. A. S. M. E., Oct., 1913; 29 pp., illus.)

23,672—PUMPS—Notes on Electric Pumps. Sydney F. Walker. (Eng. and Min. Journ., Oct. 18, 1913; ½ p.) 20c.

23,673 — RESCUE APPARATUS — Ueber Sauerstoff-Atmungsgeräte mit und ohne Injektoren. Forstmann. (Glückauf, Sept. 27, 1913; 5 pp., illus.) On oxygen-inhaling apparatus with and without injectors. 40c.

23,674—STEAM BOILERS—Wirkungsgrad von Dampfkesseln mit Hochofen- und Koksofen gas-Heizung und Wärmeverbrauch von Gasmaschinen. H. Ortmann. (Stahl u. Eisen, Aug. 21, 1913; 2½ pp.) Efficiency of steam boilers heated by blast-furnace and coke-oven gas and consumption of heat by gas engines. 40c.

SAMPLING AND ASSAYING

23,675—CALCIUM—Beitrag zur Massanalytischen Calciumbestimmung. Döring. (Zeit. f. Angew. Chem., Sept. 5, 1913; 1¾ pp.) Contribution to the volumetric estimation of calcium. 40c.

23,676—MINE SAMPLES—Notes on the Assay of Mine Samples. Robert Dures. (Journ. Chem., Met. and Min. Soc. of So. Afr., Aug., 1913; 4 pp.) Discussion on paper previously indexed. 60c.

23,677—SLAG ANALYSIS—Determination of Lead in Unchilled Slags. Richardson T. Wilder. (Eng. and Min. Journ., Oct. 11, 1913; ¾ p.) 20c.

INDUSTRIAL CHEMISTRY

23,679—AMMONIA—Etudes des Nouveaux Systèmes de Condensation Goudronneuse du Gaz de Houille et de Production du Sulfate d'Ammoniaque. Charles Berthelot. (Rev. de Met., Sept., 1913; 23 pp.) Continuation of article previously indexed.

23,680—ATMOSPHERIC NITROGEN—La Fabrication industrielle de l'Azote pur par l'Air liquide. Henri Brot. (Génie Civil, Sept. 13, 1913; 6 pp., illus.) 40c.

23,681—ATMOSPHERIC NITROGEN—Le Probleme de la Fixation Industrielle de l'Azote. Camille Matignon. (Bull. Soc. d'Encour., June, 1913; 25 pp.)

23,682—ATMOSPHERIC NITROGEN—The Decomposition of Feldspar and Its Use in the Fixation of Atmospheric Nitrogen. William H. Ross. (Journ. Ind. and Eng. Chem., Sept., 1913; 3¾ pp.) 60c.

23,683—PHOSPHORIC ACID—Contributions to the System: Lime, Phosphoric Acid, Silica. Otto Nielson. (Am. Fertilizer, Sept. 20, 1913; 6 pp., illus.) Translated from Ferrum. 20c.

23,684—SCIENTIFIC MANAGEMENT—The Chemist and Scientific Management. H. W. Gillett. (Journ. Ind. and Eng. Chem., July, 1913; 7¾ pp., illus. 60c.

23,685—WOOD PRESERVATION—Der Künstliche Schutz des Holzes durch Aetzsublimat. (Kyanisierung.) Mo'l. (Zeit. f. angew. Chem., Aug. 22, 1913; 5 pp.) Artificial protection of wood by corrosive sublimate (Kyan's method). 40c.

MATERIALS OF CONSTRUCTION

23,686—CEMENT—A Bonus System for the Purchase of Portland Cement. W. C. Reibling. (Philippine Journ. of Science, Apr., 1913; 18 pp.)

23,687—CEMENT—Southwestern Portland Cement Works near El Paso, Tex. Charles A. Smith. (Eng. and Min. Journ., Oct. 18, 1913; 4 pp., illus.) 20c.

23,688—CEMENT MATERIALS and the Manufacture of Portland Cement in Montana. W. H. Andrews. (Bull. A. I. M. E., Sept., 1913; 4¾ pp.) 40c.

23,689—CEMENT PLANT—Depreciation and Obsolescence with Special Reference to a Cement Plant. Richard K. Meade. (Journ. Ind. and Eng. Chem., Sept., 1913; 3¾ pp.) 60c.

Collection of the Income Tax

WASHINGTON CORRESPONDENCE.

The first important step toward the application of the income tax was taken by Secretary McAdoo on Saturday, Oct. 25, in the issuance of rules governing the application of the law and collection of the income tax from individuals. The mechanism now in force for the collection of the corporation tax was not changed and it is understood that that is to remain practically in operation as it is now. The new rules applicable to individuals are, however, of great importance in their bearing on corporations, including mining corporations, because they lay upon these corporations the duty of collecting the tax at the source, by deducting from the amounts they pay to individuals the proportion which is due to the Government.

The new rules are elaborate and detailed, including a great many forms. These will be freely sent to all mining corporations which have bonds outstanding. The main part of the regulations, apart from the forms includes the following points:

Under the Income Tax Law, enacted Oct. 3, 1913, a tax of 1%, designated in the law as the normal tax, shall be deducted at "the source," beginning Nov. 1, 1913, from all incomes accruing and payable to: (a) Every citizen of the United States, whether residing at home or abroad. (b) Every person residing in the United States, though not a citizen thereof, which may be derived from interest upon bonds and mortgages, or deeds of trust, or other similar obligations, including equipment-trust agreements and receivers' certificates of corporations, joint-stock companies or associations and insurance companies, although such interest does not amount to 3000 dollars, excepting only the interest upon the obligations of the United States or its possessions, or a State or any political subdivision thereof.

The term "debtor," as hereinafter used, shall be construed to cover all corporations, jont-stock companies, or associations and insurance companies.

For the purpose of collecting this tax on all coupons and registered interest, originating, or payable, in the United States the source shall be the debtor (or its paying agent in the United States) which shall deduct the tax when same is to be withheld, and no other bank, trust company, banking firm, or individual taking coupons for collection, or otherwise, shall withhold the tax thereon; provided that all such coupons, or orders for registered interest, are accompanied by certificates of ownership signed by the owners of the bonds from which the coupons were detached. These certificates shall be in the forms hereinafter prescribed and a separate certificate shall be made out by each owner of bonds for the coupons or interest orders for each separate issue of bonds or obligations of each debtor.

If, however, the coupons are not accompanied by certificates as prescribed above, the first bank, trust company, banking firm or individual or collecting agency receiving the coupons for collection or otherwise, shall deduct and withhold the tax and shall attach to such coupons its own certificate, giving the name and address of the owner of, or the persons presenting such coupons if the owner is not known, with a description of such coupons also setting forth the fact that they are withholding the tax upon them; whereupon the debtor shall not again withhold, the tax on said coupons, but in lieu thereof shall deliver to the Government the certificate of such bank, trust company, etc., which is withholding such tax money. Any corporation, collecting agency, or person first receiving from any interest coupons or orders for the collection of registered interest, and to whom the certificates above provided for are delivered, should require the persons tendering such coupons or orders for registered interest satisfactorily to establish their identity.

A debtor whose bonds may be registered both as to principal and interest, shall deduct the normal tax of 1% from the accruing interest on all bonds before sending out checks for said interest orders signed by the registered owners or before paying such interest orders signed by the registered holders of said bonds until there shall be filed with said debtor or its fiscal agent (and not later than 30 days prior to March 1) through whom said interest is customarily paid, the proper certificates claiming exemption from liability for said tax.

The debtor may appoint paying or fiscal agents to act for it in matters pertaining to the collection of this tax upon filing with the collector of internal revenue of its district a proper notice of the appointment of such agent or agents.

Iron Blast Furnaces at Perth Amboy

In his testimony at the hearing of the Government's dissolution suit against the Steel Corporation on Oct. 22, Frank S. Witherbee, president of Witherbee, Sherman & Co., told something of the plans of that company respecting the projected blast-furnace plant near Perth Amboy, N. J.

Mr. Witherbee testified that only a small part of the Adirondack properties is now in operation and that his company has 9000 acres of idle ore lands in Cuba.

"We can supply the present demand from the Mineville, N. Y., district alone," he said.

He was asked about the two blast furnaces that Witherbee, Sherman & Co. contemplate building at Perth Amboy. He said they are to take care of the excess products of the mines in Cuba and the Adirondacks. He added that the company also expects to use some ore from the Lake Superior district.

"On the completion of the barge canal across the state of New York," said Mr. Witherbee, "it will be cheaper to deliver Lake Superior ore in New York than in Pittsburgh."

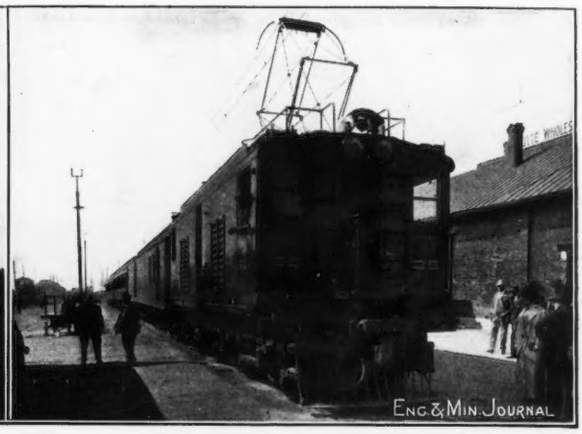
Calamine at Leadville

The most important of the known deposits of calamine at Leadville are situated on the northern side of Carbonate hill and are in the Maid of Erin, Henriette, Clontarf, Brookland, Monte Cristo, Wolftone, Waterloo, Morning Star and Big Chief mines. The first six of these are under lease to, and are worked by, the Western Mining Co., a Guggenheim concern; and all the others are worked through the Wolftone Shaft of the Western Mining Co. No important deposits of calamine of a marketable grade have been opened elsewhere in the district, although deposits of low-grade zinc carbonate, of more or less extent, are known to be widely distributed throughout the mineralized area.

PHOTOGRAPHS FROM THE FIELD

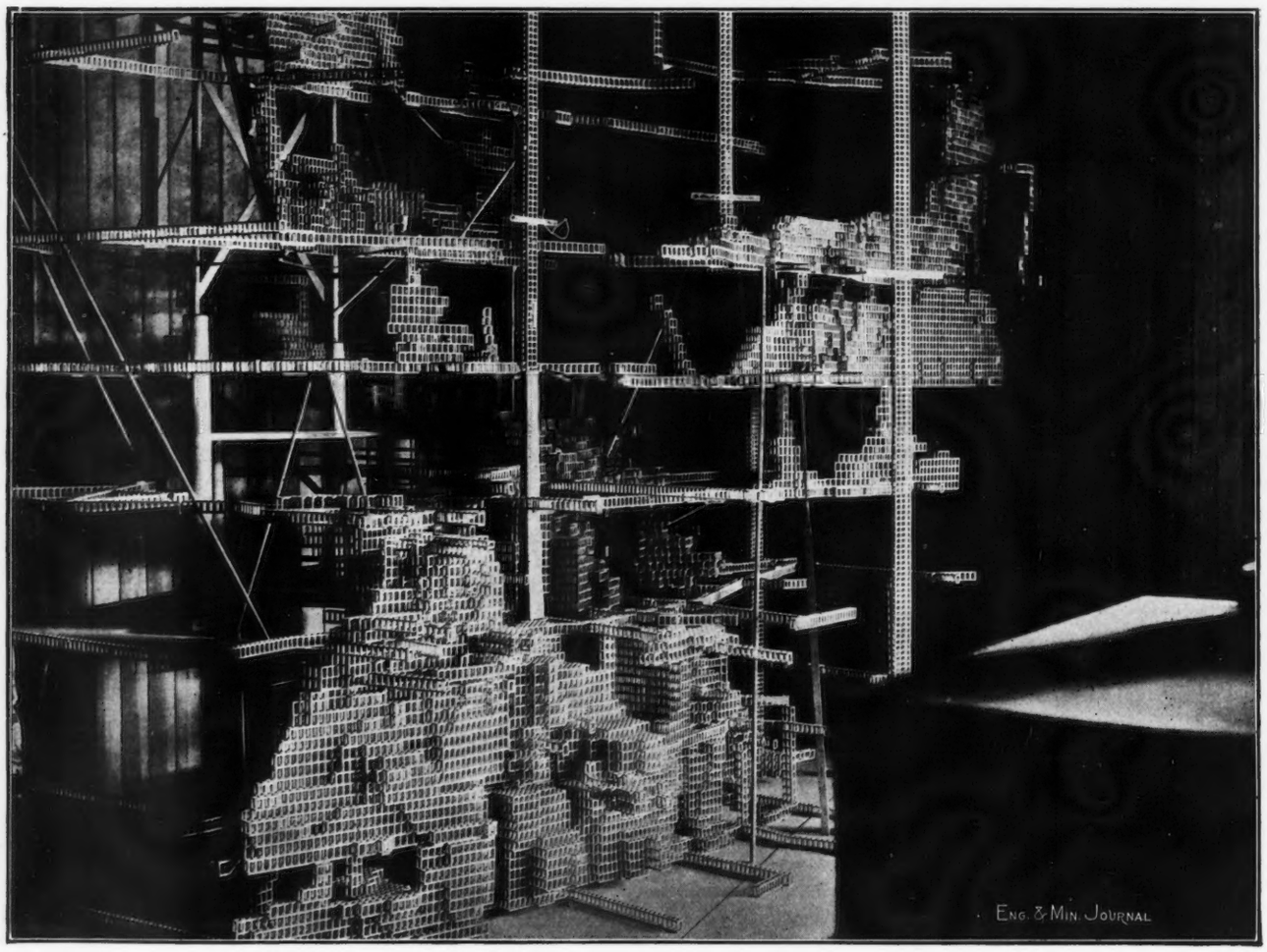
FIRST SHIPMENT FROM SOUTH CUYUNA RANGE

The ore was shipped from the Barrows mine, Oct. 2. On the Minnesota iron ranges it is customary to decorate initial shipments, as here shown, for the 120-mile trip to the docks.



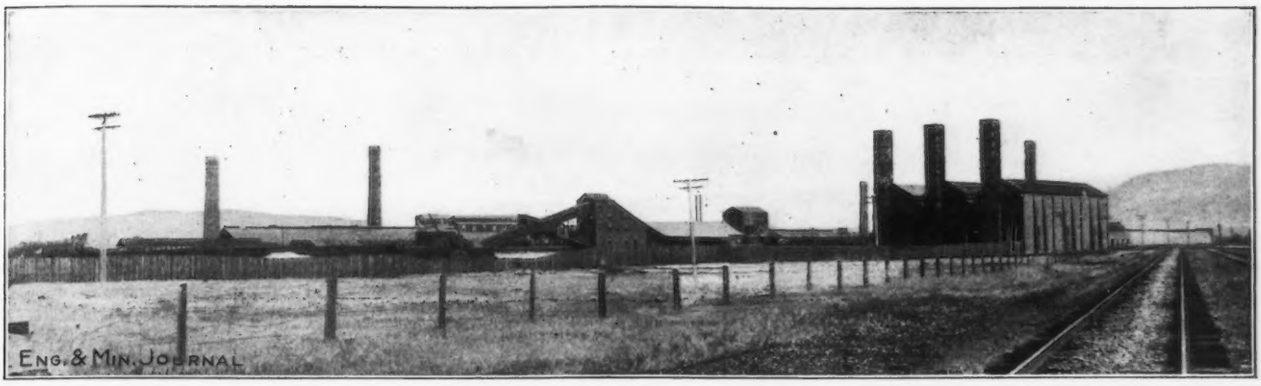
BUTTE, ANACONDA & PACIFIC ELECTRIC TRAIN

Electrification has been completed between Butte, Mont., and the Washoe Smelting Works, at Anaconda. The first regular trip was made Oct. 1.



MODEL OF ONE OF THE ANACONDA COMPANY'S MINES AT BUTTE

Every set of timber is shown in detail, made of little sticks of wood, cut to scale and glued in place. The builder worked two years on the model.

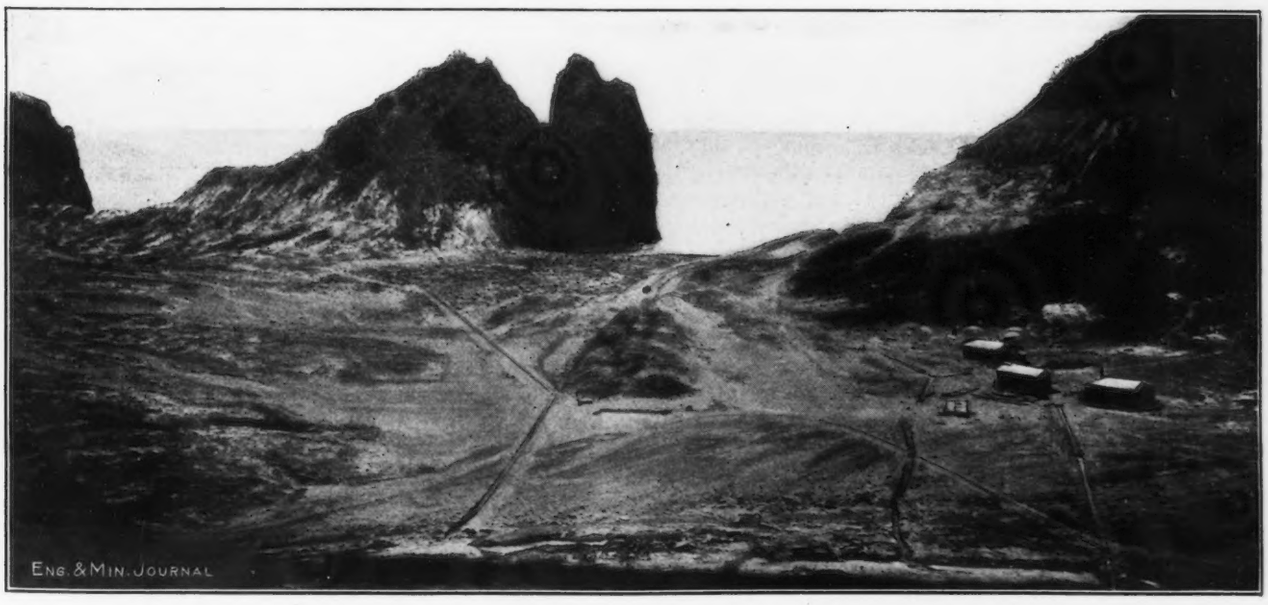


SMELTING WORKS AT EAST HELENA, MONTANA

The building at the right with three chimneys is the baghouse.

THE WHITE ISLAND, NEW ZEALAND, "SULPHUR" LAKE

The hot spring across the lake, now drained, is one of the sources of sulphur.



ANOTHER VIEW OF THE WHITE ISLAND WORKINGS

Sulphur occurs on the bottom of the lake which has been drained and the nearly pure sulphur mined. The hot springs yield several tons hourly of sulphur, 94% pure. This unique volcanic "sulphur works" is described on the first page of this issue of the "Journal."

The American Mining Congress

SPECIAL EDITORIAL CORRESPONDENCE

SYNOPSIS—A report of the sixteenth annual American Mining Congress, held in Philadelphia during the week of Oct. 20.

The sixteenth annual session of the American Mining Congress began in Philadelphia, Oct. 20. A brief summary of the opening days of the congress was given in the last issue of the JOURNAL. The meeting was called to order at 2 p.m. by F. H. Wigton, chairman of the local executive committee, and the chair was taken by Dr. D. W. Brunton, of Denver, president of the congress. Addresses of welcome were made on behalf of the mayor and corporate authorities of Philadelphia, and the governor of Pennsylvania. Appropriate responses were made by Doctor Brunton. The rest of the afternoon session was devoted to brief speeches by members of the different state delegations, who summed up in a few words the conditions of mining in their different states and the needs of the industry. Appeals were also made for the enactment of workmen's compensation laws as nearly uniform as possible in the different states and for the conservation of the coal deposits of the country.

THE PRESIDENT'S ADDRESS

At the evening session, Dr. D. W. Brunton, president, delivered his annual address, which was devoted largely to the difficulties existing in securing title to valuable mineral deposits by the discoverer, and to the exactions which the prospector may meet before he can secure the reward of his labors. He referred at some length to the imperfections of the existing law and to the possibilities of litigation which deterred many miners from going on with their investigations of the mineral deposits. He referred also to the long discussion over the desirable amendments to the mining law made by various committees and technical societies in which the American Mining Congress had taken a prominent part. He also referred to the antagonism which had unfortunately arisen in California, Montana, Utah and other Western states between the farmers and the miners. Another point was the difference in the laws and regulations for the operations of mines in different states, another branch of this subject being the differences in safety provisions required and in the workmen's compensation laws.

The gradual absorption of the smelting industry by large corporations, which were able to dictate to the miners, was also considered. In conclusion, the work of the Bureau of Mines was referred to and approved, so far as it had gone, and an appeal was made for larger appropriations in order that the bureau may be able to extend its work. The crying need of the industry, however, is a thorough revision of the present mining laws.

MINE TAXATION

At the morning session on Tuesday, Oct. 21, after the appointment of committees and some other routine business had been disposed of, papers on the "Taxation of Mining Property," by R. V. Norris, of Wilkes-Barre, Dr. H. M. Chance, of Philadelphia, and D. L. Webb, of Denver, were read. These papers referred to the various systems of taxing mine property in existence in the different states and appealed for greater uniformity in the different systems of assessment. Levying taxes upon output, or upon operating profits was strongly objected to, and the difficulties attending the assessment of mining property, which is gradually decreasing in value as the coal or ores are removed, were mentioned as an important factor in the case. A more uniform system in the different states is considered one of the needs of the mining industry.

These papers were discussed at length by many members. The opening speeches were made by Prof. H. L. Smyth, of Cambridge, Mass., Harry N. Taylor, of Chicago, and T. H. O'Brien, of New Mexico, and many others joined in the discussion. The session concluded with papers on "Mine Accounting," by J. B. L. Hornblower, of Pittsburgh, and on "Uniform Requirements of Official Mine Reports," by S. A. Taylor, also of Pittsburgh. A short discussion followed these papers.

There was no session in the afternoon, a number of members joining in a steamboat excursion on the Delaware River to visit the docks and other public works on the river front of the city and also the League Island navy yard. Many of the members spent the afternoon in visiting the exhibition of mining machinery in Horticultural Hall, where there were many interesting features.

THE EVENING SESSION

At the evening session, on Tuesday, papers were read on "Mine Rescue and Recovery Work," by Dr. Charles E. Munroe, of the Bureau of Mines, and on the "Use and Abuse of Explosives," by R. W. Gunnell, of Pottsville. These were discussed by J. W. Paul, George S. Rice, H. M. Wilson, B. N. Dunn and others. A short paper on "The Use of Concrete in Mining Operations" was presented by E. C. Sargent, and an elaborate paper on the "Coal Resources of Alaska," by Dr. W. R. Crane, of the Pennsylvania State College. Doctor Crane is a believer in the great extent of those resources, while fully realizing the many difficulties attending their development. He believed, however, that in time they would be of great importance to the country.

THE WEDNESDAY SESSIONS

At the morning session, a report from the committee on Alaskan affairs was presented by F. Joslyn, of Fairbanks, Alaska, and a paper on "Public Lands," by Dr. James Douglas, was read, Doctor Douglas himself being unable to be present. An address on "Industrial Corporations and Scientific Research," by D. B. Rushmore, of Schenectady, N. Y., was also presented.

At the afternoon session, a report was presented and received by the committee on the Revision of the Mineral Land Laws. Dr. George Otis Smith, director of the U. S. Geological Survey, presented a paper on this subject, in which he presented at considerable length the various considerations affecting the tenures of mining properties on the public lands, and expressed a belief that the ulti-

mate solution of the question would be found in a leasing system, and in the reservation by the Government when granting patents to surface or agricultural lands of all mineral deposits beneath the surface. The possessory title to the mineral should be retained by the Government, not for the purpose of asserting any theoretical right, but as a practical method of securing development under proper conditions. This would be of especial importance in relation to deposits of such public necessaries as coal, petroleum, phosphates and potash. This system would also discourage the locking up of mineral deposits for speculative purposes. He believes that in time such a system would prove to be of general benefit to the mining industry and would be generally favored by the people.

U. S. Senator John F. Shafroth, of Colorado, then made an address on "The Administration of Public Lands as Affecting the Mining Industry," which was rather an arraignment of the land system and its administration. Senator Shafroth is an energetic speaker and his address excited general attention.

The feature of the evening session was a paper on "Big Business in Its Relation to Industrial Prosperity with Particular Reference to Mining," by Prof. Charles R. Van Hise, of the University of Wisconsin. Doctor Van Hise referred at much length to the practical breakdown of competitive methods and small mines and to the many and great advantages to be secured by combination. He gave many instances of the different systems in different branches of mining, and advocated a system of combinations or large aggregations of capital and effort to be controlled by a national commission with powers analogous to those of the Interstate Commerce Commission. His plan, in short, was very similar to that suggested for the regulation of the iron and steel industries suggested by Judge Gary when he was before a congressional committee last year. Doctor Van Hise brought forward many instances and referred to the present condition of the bituminous coal trade as an illustration. His paper attracted much attention, but the time was too short for a long discussion.

Radium Resources of the United States

A paper by Dr. Charles L. Parsons, of the Bureau of Mines, referred to the discoveries of carnotite in Colorado and to its mining by several parties who shipped their ores to Europe, especially France and Germany, where it is used in the manufacture of radium. It is believed that these deposits are the most important source of radium yet found, and their development has now been undertaken by a new association, the particulars of which are given in Doctor Parsons' paper as follows:

In closing, I take pleasure in saying that I am authorized by the Director of the Bureau of Mines to announce that a coöperative agreement has been entered into with the newly organized National Radium Institute, whereby the Bureau obtains the opportunity of a scientific and technological study of the mining and concentrating of carnotite ores and of the most efficient methods of obtaining radium, vanadium, and uranium therefrom, with a view to increased efficiency of production and the prevention of waste.

The National Radium Institute was recently incorporated with the following officers: Howard A. Kelly, of Baltimore, president; Curtis F. Burnam, of Baltimore, vice-president; Archibald Douglas, of New York, secretary and treasurer; James Douglas, of New York, and E. J. Maloney, of Wilmington, as additional directors.

The institute has no connection with the mining of pitchblende, details of which recently appeared in the Denver papers. It has, however, obtained the right to mine 27 claims in the Paradox Valley region, among which are some of the best mines in this richest radium-bearing region of the world. Nearly 100 tons of high-grade carnotite have already been procured. Under the agreement with the Bureau of Mines, the technical operations of the mines and mill are to be guided by the scientific staff of the Bureau. Work will begin in an experimental plant to be erected in Colorado, using entirely new methods developed at the Denver office of the Bureau of Mines. Concentration experiments also will be conducted in the Paradox, probably at the Long Park claims, and if successful will be applied to reducing the wastes that now take place. Within a year at most, the mill operations should make results certain and the extraction of ore and production of radium will then be continued on a larger scale. The separation of uranium and vanadium will also be studied, a contract having already been signed for all of these byproducts that may be produced.

The institute has been formed for the special purpose of procuring enough radium to conduct extensive experiments in radium therapy with special reference to the curing of cancer.

The Thursday Sessions

The morning session on Thursday, Oct. 23, was opened by Dr. Charles E. Van Barneveld, of San Francisco, who presented the claims of the mining department of the Panama-Pacific Exposition.

The committee on Coal-Mining Legislation presented a brief report of progress, after which Edward W. Parker, of the U. S. Geological Survey, read a paper on "The Cost of Coal Production," presenting a careful analysis of the figures on this point as collected by the Census Bureau and showing the small margin of profit on which the business of bituminous coal mining has been and is conducted in this country. John W. Boileau, of Pittsburgh, made an address on "What Is the Matter with the Coal-Mining Industry?" in which he urged a greater degree of combination and coöperation in order to secure reasonable prices. A long discussion followed the reading of these papers, which was opened by A. J. Moorshead, president of the Madison Coal Co., of Illinois, who was followed by a number of other speakers. Mr. Moorshead referred at considerable length to the conditions under which mining is conducted in what are known as the competitive states—including western Pennsylvania, Ohio, Indiana and Illinois—and the difficulties under which the operators in some of those states labored from the existence of strict mining laws involving expensive improvements and precautions in working. He said that the operators in those states would have no objection to these laws, and would be perfectly willing to comply with their requirements, providing that similar laws existed in all the states; but the requirements varied so widely that it imposed an unjust burden in certain states and prevented them from securing business in competition with others. He advocated either uniform laws in all the states, or general federal regulation. His line of argument was approved by a number of the other speakers. General approval was also expressed of E. W. Parker's paper, and his conclusions were accepted as just and of great service to the industry.

In the afternoon, a special executive meeting of coal operators for general discussion and consideration of the mining situation, was held. This meeting was private and there were no reports of the proceedings. At the general session, a number of papers were read, and briefly discussed. These papers were as follows: "Gold Mining in Georgia," by W. H. Fluker, Thompson, Ga.; "Joint Meetings of Mining Organizations," by H. M. Wilson,

Pittsburgh; "Federal Aid for Mning Schools," by Dr. Erasmus Haworth, Lawrence, Kan.; "The Federal Government and the Mining Industry," by Dr. Martin D. Foster, Chairman of the House Committee on Mines and Mining. Mr. Fluker's paper presented a hopeful view of the possibilities of gold mining in Georgia and believed that the best results would be obtained in the future as they had been in the past by what is known as the old Dahlonega method of mining.

The Smoker

In the evening, nearly all the members and a number of guests attended the smoker and reception, provided by the reception committee. This was a very enjoyable affair, a very good program of entertainment being presented, followed by a supper. There was a general discussion of more or less personal nature with a renewal of many old acquaintances and the meeting of many new ones. The entertainment concluded at an early hour in the morning and was very much enjoyed by those present.

The Friday Sessions

On Friday morning the committee on standardization of electrical equipment presented its report through George R. Wood, of Philadelphia. The committee on resolutions presented a preliminary report, which was put over until the afternoon session. The Committee on Ways and Means presented a report showing that the finances of the congress were in a backward condition and suggesting various means for paying off arrears and continuing its work. Among these was a proposition providing for the obtaining of a larger number of regular yearly subscriptions, and also for the publication by the secretary of a periodical which should contain reports of legal decisions and notes of legislation in Washington and the various states. The maintenance of an office at Washington was also suggested. This report was discussed at length from different points of view and was finally referred to the directors for further consideration.

Hon. William B. Wilson, Secretary of the Department of Labor at Washington, then made a very clear and interesting address on "Arbitration as a Factor in the Mining Industry." He dealt especially with coal-mine labor and the coal-mining industry, with which he was most familiar, and showed the advance that had been made through combinations and the discussion of questions by operators and miners, and dwelt on the many advantages which had been obtained by arbitration. Mr. Wilson did not believe in the possibility of compulsory arbitration, but he is a thorough believer in the advantages of arbitration in the settlement of disputed questions. His address was discussed by Messrs. Green, Connell, Watkins and others, and Mr. Wilson replied to the various points raised.

The Closing Session

At the closing session in the afternoon, reports on workmen's compensation and accident-prevention work were presented and there was discussion in which John H. Jones and S. A. Taylor, of Pittsburgh, E. T. Bent, of Chicago, David Ross, of Springfield, Ill., and Thomas L. Lewis, of Bridgeport, Ohio, took the chief part. Dr. J. A. Holmes, director of the Bureau of Mines, who was unable to be present as he has only just reached San Francisco on his return from Alaska, sent a paper on "Some Problems in the Mining Industry," which was read.

The report of the Committee on Resolutions called out some discussion and there was some modification of its terms, but not of any material importance. The resolutions finally adopted may be summed up as follows:

(1) Approving of the work done so far by the Bureau of Mines and urging upon Congress not only the proper support of the bureau, but also the creation or the development of the bureau into a department of mines, the head of which shall be a member of the Cabinet.

(2) Pledging the congress in favor of the enactment of universal state laws providing protection for stockholders in mining enterprises and preventing dishonest operations of financiers.

(3) Requesting the committee of the congress on Mineral Land Law Revision to confer with, and, if possible, to enlist the support of the American Institute of Mining Engineers, the Mining & Metallurgical Society and all other kindred organizations in an effort to bring about a desirable amendment to these laws.

(4) Requesting the directors of the Geological Survey and the Bureau of Mines to coöperate with a committee of the congress on the endeavor to secure uniform legislation in the different states as to the time and form of making statistical reports.

(5) Favoring the passage by Congress of legislation providing for Federal assistance to the state mining schools.

(6) Providing for a special committee of the congress to investigate and recommend a uniform and equitable system of assessment and taxation of mining properties, and urging upon the different states the passage of laws to that affect.

(7) Urging upon Congress some provision for the construction of railroads and other measures to assist in the proper development of the mineral resources of Alaska.

(8) Requesting the Treasury Department to make proper regulations, instructing the collectors of internal revenue to proceed on a uniform system of allowances for depreciation in arriving at the net income of mining companies for taxation.

(9) Expressing sympathy with the relatives and friends of those who lost their lives in the explosion of the Dawson mine in New Mexico, and joining with the officials of the company in regretting that all their efforts toward safe operations of the mines had proved of no avail in preventing this regrettable accident.

(10) Urging some modification of the anti-trust law which will permit reasonable coöperation among coal operators which may result in securing a fair regulation of the industry and incidentally increasing the safety of mining and providing for the proper conservation of our natural resources.

(11) Tendering thanks to the local committee, the citizens of Philadelphia and others who aided in the entertainment and in the proceedings of the congress.

At the meeting of the incorporated members the following officers were chosen for the ensuing year: President, Carl Scholz; first vice-president, Hennen Jennings; second vice-president, M. S. Kemmerer; third vice-president, Harry A. Day; directors, W. J. Richards, M. S. Kemmerer and E. A. Montgomery.

During the continuance of the congress, and for two or three days before and after its sessions, the Bureau of Mines presented in the lecture room of Horticultural Hall a series of demonstrations and lectures in some cases illustrated by moving pictures. These were under the immediate charge of Charles Enzian, mining engineer of the bureau, and included the various forms of first-aid and rescue work, the mining of bituminous coal and iron ore, the manufacture of coke and the production of pig iron. These lectures were largely attended not only by members and attendants at the congress, but also by citizens of Philadelphia.

In one end of the hall, a sort of working model of a gold mine had been built which was visited by a large number of people.

The Machinery Exhibit

The greater part of Horticultural Hall, which is on Broad St., a short distance from the Bellevue-Stratford Hotel, where the meetings of the congress were held, was the exhibit of mining machinery and appliances. A very interesting exhibit comprising a wide range of objects was here collected. Coal-mining machinery rather predominated, as might be expected from the location of the meeting in an Eastern city, but there was much that was interesting to all classes of miners. Mining machines, mine locomotives, models of conveyors and other handling plants, pumps, car-loaders, miners' lamps and a great variety of other appliances were here collected and could be readily inspected.

The exhibits which at first sight attracted most attention, were, of course, those of the larger and heavier machinery. Prominent among these were a number of mine locomotives for electric driving, including those of the Baldwin Locomotive Works, the Vulcan Iron Works, and the Jeffrey Manufacturing Co., the latter showing a gathering locomotive with combined trolley and storage battery. A gasoline mine locomotive was shown by the Milwaukee Locomotive Co. Mine cars, mine wheels, and appliances were exhibited by several well known companies. Storage batteries for use on mine locomotives and for other purposes, were well presented by the different electric companies.

Interesting features were shown in a number of models and drawings of coal-handling plants, car hauls and dumping plants, some of them involving important new features. Driers and magnetic separators were also represented in the same way. Especially interesting in this class were the exhibits of the American Concentrator Co., the Bartlett & Snow Co., the Fairmont Mining & Machinery Co., the Link Belt Engineering Co., and several others.

Mining machines of various kinds were also well shown by different companies, including the Goodman Manufacturing Co., and the Jeffrey Manufacturing Co. The latter showed a novelty in the form of a coal-cutting machine especially designed for use in anthracite coal seams.

Pumps, of course, were not neglected and a number of mine pumps of various designs and for both steam and electrical drive were in evidence.

An interesting collection of miners' lamps was presented by various manufacturers. These included oil, naphtha, electric and acetylene lamps with safety machines for relighting and several magnetic fastening and unlocking machines. All the standard types were included, with several new and excellent patterns, intended especially to secure safety and convenience combined with the best service to the miner.

The display of instruments by various well known firms was a very interesting one, including mathematical and survey instruments, balances, assay and testing apparatus and many other kinds. Chemicals and chemical apparatus for mine use were also shown by a number of well known firms.

Mine-rescue apparatus was also shown, together with first-aid appliances for the injured. These were also to be seen at the demonstrations conducted by the Bureau of Mines.

The United States Steel Corporation and several of its subsidiaries had exhibits made by their Bureaus of Safety and Sanitation, these consisting largely of photographs, drawings and copies of rules intended to secure safety and to assist employees.

We regret that space forbids our giving a full list of the different firms and companies which contributed to this very interesting exhibit.

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Oroville Dredging, Ltd., Oroville Dredging Co., Ltd., and Pato Mines, Ltd.

San Francisco Correspondence

Oroville Dredging, Ltd., operating in Oroville and Bear River fields of Feather River division in California, with capital stock of $3,500,000 all issued and outstanding, has for several years been the holding company for the Boston & Oroville Mining Co., Boston & California Dredging Co., Oroville Gold Dredging & Exploration Co., Continental Gold Dredging Co. and Bear River Mining Co. The assets of all the above named subsidiary companies were, in October, 1913, taken over by the holding company; the articles of incorporation of Oroville Dredging, Ltd., were filed with the Secretary of State at Sacramento, and the head office of the company removed from Boston, Mass., to Insurance Exchange building, San Francisco. The directorate of the company is composed of F. W. Baker, of London, president; W. P. Hammon, of San Francisco, vice-president; C. W. Gardner, R. K. Barrows, J. C. Osgood, F. C. Van Deinse. A. E. Boynton is secretary-treasurer.

The natural and expected result of this transaction will be the dissolution of the subsidiary companies. The important and interesting feature of the situation, which has quickly followed the merger, is that 90% of the stockholders of Oroville Dredging, Ltd., have exchanged their stock for stock of Oroville Dredging Co., Ltd., which is an English corporation. This English corporation, besides now holding the 90% of the stock of the American corporation, owns a majority of the stock of Pato Mines, Ltd., operating a 9-cu.ft. bucket-elevator all-steel dredge in Colombia, S. A., built by the Yuba Construction Co., of Marysville, California.

A further interesting and still more important fact in this connection is the extraordinary gold production of the Pato dredge. We are permitted to take the following statement from the directors' report and audited accounts of Oroville Dredging Co., Ltd., as presented by F. W. Baker, chairman of the company, to the sharehold-

ers' meeting in London on Oct. 4, 1913, and returns supplemental thereto.

STATEMENT SHOWING DREDGING RETURNS FROM PATO MINES JAN. 9, 1913, TO OCT. 14, 1913, INCLUSIVE

	Cu.Yd. Washed	Estimated Value
For period from Jan. 9 to Sept. 2, 1913	576,050	$101,258
For week ended Sept. 9	18,600	13,650
For week ended Sept. 16	14,550	7,350
For week ended Sept. 23	14,650	10,150
For week ended Sept. 30	22,100	18,700
For week ended Oct. 7	23,500	21,900
For week ended Oct. 14	22,500	18,200
	691,950	$191,208

The total average value of the gravel dug in the nine months, as shown by the statement, was 27.6c. per cu.yd. The minimum weekly average was about 8c., while the maximum weekly averages ranged from 50c. to 93c. per cu.yd. These are extraordinary yardage values and greatly in excess of any dredged gravel yield in California for like continuous periods. In order to facilitate the transportation of materials for the construction of the dredge the company was unable to begin operations in tested ground and 427,000 cu.yd. of gravel was dug in going to the tested ground. This supposed barren ground yielded an average of 14.27c. per cu.yd. and for five weeks showed a maximum yield of from 31c. to 43.77c. per cu.yd. dug per week. The average cost of digging has been below 10c., probably 8c. per cu.yd., and this cost covers the delay and expense resulting from the overturning of the dredge in the early period of initial operation, besides other delays and extraordinary expenses. The company had in the beginning 310 acres of tested ground, and about 20,000 acres not tested, but a part of it now is being Keystone drilled.

Hand-Picking Iron Ore

By P. B. McDonald*

Hand picking of iron ore has never been attempted to any great extent in the Lake Superior region, although at the old hard-ore mines of the Marquette range there have been occasional trials. Rogers, Brown & Co. now propose to hand pick the yellow, limonite ore at their Portland and Ohio mines, at Michigamme, operated under the name of the Niagara Iron Mining Co. These mines are at present practically idle, never having been very profitable. The shipments in the past have run about 48% in iron, and it is expected to raise the grade by hand picking after crushing.

A crusher plant has been installed at the Ohio shaft to serve both mines. The crusher house is 70 ft. high and has concrete foundations. The sill timbers are coated with creosote. A double skipway leads up to a gyratory crusher of 800 tons daily capacity; the ore is dumped from the skips upon grizzlies, thence it falls to the crusher. The crushed ore passes to a wide endless belt where the hand picking will take place.

It may be found necessary to spray water on the crushed material to distinguish ore from rock; the fines will be let drop through a screen previous to going on the belt. The Portland mine is an openpit that was stripped of overburden two years ago. It is estimated that 250,000 tons of ore are exposed ready for mining and steam shoveling. Later the deeper portions of the orebody may be mined by underground methods. The Ohio mine is an underground mine adjoining the Portland, and has been filled with water for several years, although plenty of ore remains. The Portland ore will be drilled, blasted, loaded by steam shovel into railroad cars and hauled to the Ohio crushing plant for crushing and hand picking. The mines will be reopened as soon as demand for the ore warrants it.

*Mining engineer, Gouverneur, N. Y.

John Coit Adams

John Coit Adams, superintendent of the Boston & Montana Mines Department, of the Anaconda Copper Mining Co., died at Butte, Oct. 24, after a long illness. He had for nearly 25 years been identified with the mining interests of Montana, and since 1900 had been a resident of Butte, where he was numbered among the city's representative citizens.

Mr. Adams was a native of Honolulu, Hawaiian Islands, and was born July 17, 1867. His father, Edward P. Adams, was born and reared in Maine, but when a young man went to the Hawaiian Islands, where he resided for a period of 30 years, during which time he was prominently identified with the business interests of that city, acting for a number of years as the American consul. He subsequently returned to the United States and passed his remaining days in Cambridge, Mass., where his death occurred. He married Miss Caroline Wright, who died in Honolulu.

John C. Adams passed his boyhood days in Honolulu until about the age of eight years, when he was sent to Castine, Maine, there completing his preparation for college. Entering Harvard University, he pursued a special course as a member of the class of 1887. After graduating he went to Portland, Ore., where he was located for about one year, and then went, in 1887, to Montana, which has ever since been the scene of his activities.

His first employment in that state was at the Hope mine, at Philipsburg, where he remained two years. Subsequently he was for a period of five years connected with the Bi-Metallic mine near Philipsburg. In 1901, he entered the employ of the Boston & Montana Co. as foreman of the Pennsylvania mine, and in 1904 was appointed general superintendent of the Boston & Montana mines, in which capacity he had ever since remained. Mr. Adams was one of the best known and most capable men in the mining world of Butte, where his business experiences have been of a broad and varied character, and his high position was earned solely through merit. During the famous underground fight between the Amalgamated and the Heinze companies, Mr. Adams had charge of the proceedings for his company, in which his skill and ultimate success are a matter of history in Butte.

In political matters he was a stalwart in the ranks of the Republican party, and while no aspirant for political honors he was one of the party's counselors and advisers in his section. In a fraternal way he was affiliated with the Benevolent and Protective Order of Elks, while socially he is a member of both the Silver Bow and University Clubs. He was a member of the American Institute of Mining Engineers.

At Butte, in March, 1898, Mr. Adams was married to Miss Ethlyn Caldwell, who was born and reared in Michigan, and two children were born to them: Nina, born in 1899, and Jaquelin, born in 1908.

EDITORIALS

What Is the Matter with the Mining Industry?

At the recent meeting of the American Mining Congress several speakers took up the question, "What is the matter with the mining industry?" That there is something the matter seems to be generally admitted. Of course, it is recognized that the tonnage of ore produced by the operating mines of the United States and the yield of iron, copper, lead and zinc is increasing all the time, while the production of gold and silver is, at least, being maintained. There is, however, undoubtedly a dullness in the buying and selling of mining property, an absence of interest in the development of prospects, and a decline in activity among the little mines of many parts of the Rocky Mountain region. Promoters have fallen upon hard times, the mining engineer unconnected with the large companies finds relatively little to do and more than one has abandoned his profession for work that affords better opportunities, while machinery manufacturers in several quarters, by no means all, experience a slowness of demand for their goods.

All of these are undeniable facts. As to the causes, however, there is no general agreement. The talk in the American Mining Congress did not display any exhaustive study of the causes. Rather was the theme the necessity of "doing something," which something appeared to be legislation in Washington. There was much flapdoodle about congressional ignorance of the magnitude of the mining industry, inattention to its needs, etc., but apart from a revision of the mining laws nothing specific was demanded of Congress. Now, a revision of the mining laws is highly important, but we do not suppose that any reasonable person imagines that the abolition of the law of the apex, etc., is going to work a revival of the mining industry. Nor has anybody suggested any serious pinching effect of any of our laws that Congress may relieve. In fact, the present situation in our mining industry appears to be the consequence of economic and international factors, some of which are as follows:

(1) The situation in Mexico. No argument is necessary to show that this has seriously reduced the market for mining supplies, the employment of mining engineers, and the return on capital invested there.

(2) The exhaustion of the easily discoverable, easily developed ore resources of the United States, which has greatly reduced the opportunities of the prospector and of the mining operator of small means. This is not a sudden change, but is one that has been progressive through many years. Ore discoveries were many and frequent in the '60s and '70s, fewer and less frequent in the '80s, and still more so in the '90s. Since 1891 the only new mining districts of magnitude have been Creede, Cripple Creek, Tonopah, Goldfield, Cobalt, Porcupine and the placer districts of Alaska; no great number for a period of 20 years.

At the present time there is a great scarcity of zinc ore and of new zinc mines. Anybody who has a zinc deposit of promise does not need to go begging for a customer. On the contrary, zinc-mining interests are hunting for zinc mines, but so far as anybody knows now they do not exist. In fact, the demand for good copper, lead and gold mines is no less keen. Unfortunately, it is not known where they are. We do not mean to imply that there are no more and that they will not be found, but probably they are for the most part deep-lying deposits whereof there is little or no surface indication, deposits that await deep and costly exploring before they will be found. The zinc mines at Mascot, Tenn., and the copper mines of Miami, Ariz., are two examples that immediately occur to us. Why is there not more prospecting for such mines? This brings us to what is perhaps the chief cause of dullness in mining, viz.:

(3) The state of the world's finances. Never since the crisis of 1907 has there been anything like a well sustained boom in business in the United States. After recovery from the slump in 1908 and 1909 there were fitful periods of activity and successful speculation, but nothing of long duration or of a character to produce a substantial overflow into speculation in mining. Less than ever has there been any tendency toward that in this year 1913 when the strain on the world's capital has once more resulted in financial disturbances and established feelings of caution. This has not interfered with the financing of sure things, or nearly sure things, or what are conceived to be such, like the Alaska-Gastineau gold mines and the Chuquicamata copper mines; but capital has been little disposed to take chances in prospecting, which inherently spells risk.

The chief reasons for the so called dullness in mining are of this order, we believe, and the troubles are not of a kind for which any remedy is to be found in Congress, or in legislation by any body. In the meanwhile the affairs of the producing mines are not dull or depressed, and they are employing more men and using more material than the average of recent years.

Colonel Gorgas at Johannesburg

Col. William C. Gorgas is going to Johannesburg to assist that municipality in combating a host of endemic and industrial diseases, as noted in our Johannesburg notes. Of the three colonels eminent in Panama Canal history, Gorgas is preëminent in the far-reaching effects of his work for humanity, world over. Since the Zacapa, Guatemala, outbreak of yellow fever, in 1906, that malady has become so rare in Central America as to cause it to be considered not endemic north of the Canal. Malarial cases in Panama have been reduced from 1200 cases per thousand of population in 1906 to 81 per thousand in 1912. The credit for these records belongs to Colonel Gorgas and his staff.

Time was when sea captains had to shanghai able-bodied seamen to man a ship bound for Aspinwall, so vicious was the reputation of that port's unsanitary state.

So they changed the name, then the first colonel acquired the Canal Zone and sent the second colonel to purge it of disease so that the third colonel and his men could build the big ditch. The result is that Aspinwall has long been forgotten; there is no fear of Colon and Panama; Ancon and Cristobal have the reputation of spas. All this is the result of Gorgas' work.

Although at an elevation of 6000 ft. above sea level, Johannesburg has been the center of one of the world's most renowned malarial districts. But of almost as evil reputation is the prevalence of pulmonary disease among the gold miners of the Rand. Miners' phthisis, silicosis, tuberculosis and other diseases of the respiratory organs, and ankylostomiasis cause such a large proportion of the mortality of Transvaal mine workers that the Chamber of Mines and the government some time ago determined to exhaust every means of reducing the pernicious effects that the country's principal industry produced on the workmen. The services of Sir Almroth Wright were enlisted and now Colonel Gorgas has been called upon. We hope he may make as brilliant a record at Johannesburg as he did at Panama, but we regret his going to South Africa. Guayaquil is not yet free from yellow fever and the West Coast still trembles in fear of bubonic plague, despite the rigid quarantines and disinfections. With the opening of the Canal that coast will be so near that we would like to feel it free from taint.

Iron Smelting in New York

We have upon numerous occasions in the past prophesied the establishment of iron-smelting furnaces on the shore of New York Harbor. Our prophecy now seems in a way to be borne out, inasmuch as several projects for the erection of such plants are said to be in consideration.

The removal of the duty on iron ore enables iron smelters on the Atlantic seaboard to draw upon the immense iron-ore resources of Sweden, Newfoundland, Cuba, Brazil and Chile without any handicap, while they may command moreover a supply from domestic deposits in the Adirondacks and in Texas. There are optimists who reckon that when the barge canal across the state of New York is completed it may be possible to fetch Lake Superior ores to New York at less cost than to Pittsburgh.

New York commands a coal supply by water from Norfolk, Va., and from Nova Scotia. If the coal be coked in byproduct ovens, as is done at Everett, Mass., there will be a ready market for all the gas that is produced. The slag from the blast furnaces will fill low-lying lands along the water front and convert them into building sites worth many thousand dollars per acre.

New York is already the greatest metallurgical center of the universe. Its liberation from tariff bonds will increase the magnitude of its smelting and refining industries, which will be enhanced, moreover, by the opening of the Panama canal. Copper, lead and nickel smelting are already done here. Iron smelting will soon be done and we venture the prophecy, furthermore, that some day we shall see a revival of zinc smelting, not on the basis of New Jersey and Pennsylvania ores, as in the past, but on the basis of imported ores.

The Currency Bill

Congress has before it a bill which in any form will be of extraordinary effect upon the welfare of the nation. The bill is intended to remedy an archaic banking and currency system, to avert money panics, and to create the machinery for an expansion of trade.

The bill now before Congress has excited differences of opinion. The bankers appear to oppose it. So do the surviving exponents of populistic ideas. These parties do not, however, oppose it on the same grounds.

An economic question of this kind is capable of scientific study and developments. It is not, like the tariff question, enmeshed in the web of local interests. Why, then, should it not be referred to experienced men for such amendment as will make it as nearly right as human capacity permits? And why then should not everybody agree upon it?

To the average citizen, who confesses his own ignorance of the subject and his lack of feeling one way or another, it is incomprehensible that such a measure should be made a party question.

The 13th Census of Mines

The more we try to dig something useful out of the mining statistics of the 13th census, the more disgusted do we become. Nothing much of what anybody wants to know is to be found. When we think we have got something by analysis and deduction, we don't know whether the figures mean what we think they do. Even when we transcribe them directly we don't in many cases know with certainty what they mean.

There was never so bad a statistical fiasco as the 13th census; never a sadder waste of the public money. This apparently is recognized even in Washington, where the new director is making an effort to save something out of the wreck. There won't be much to save. His best policy will be to throw it up as a bad job and shape things for better work next time.

With respect to mines and mining we'll give the new director one brief piece of advice which will come nigh to excluding the trouble of the 13th census. It is this:

Don't let any responsible officer connected with the 13th census have anything to do with the next one.

In other words, dismiss them all—make a clean sweep. Green hands would be better than the present crew.

If Congress would forget its desire to scotch the money-devil and should devote itself to some such simple job as improving the postal service there would be satisfaction in the cañons leading from Wall St.; and also in other parts of the country. The money-devil looms larger in the mountains of Tennessee and the swamps of Arkansas than he does in what are supposed to be his haunts.

We imagine that many of our subscribers in Mexico are failing to receive their copies of the JOURNAL with regularity. We are reserving some spare copies of each number to enable them to complete their files when troubles are over. We should like to have subscribers notify us respecting this as early as possible.

BY THE WAY

It is gossiped that the Department of Justice has exonerated the American Smelting & Refining Co. of any violation of the anti-trust law.

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According to the Geological Survey, there is a plant at Park City, Utah, "equipped for acid leaching and precipitation of the gold, silver, copper and lead on scrap metal, each metal precipitating from solution on the metal for which it has the greatest affinity." How would it strike you to revise our textbooks to read, "Copper has an affinity for iron and hence precipitates on it from its solutions"? Sounds as if the Survey was going back to the alchemists.

⁂

The stock of Lake copper, which only a few months ago was disproportionately large, had been reduced to about 10,150,000 lb. on Oct. 1. Allowing for the stock of casting copper on that date, the electrolytic stock was only about 17,250,000 lb., a figure that reminds us of 1906. The Lake production in October had dwindled to 6,950,000 lb., mainly the output of the Calumet & Hecla company, which drew on its historic stock of "mineral" carried at its Buffalo works.

⁂

The "constitutionalists" of Mexico have begun to strike their own silver coinage. An example that we have seen exhibits fairly good workmanship, considering the facilities available. It is said that ore-crushing rolls were used for producing the sheet silver out of which the coins were stamped. Raids on the mills furnish most of what is needed for this and for other things. Among the other things are the making of brass cannon. The mills and machine shops have been stripped of their brass and bronze parts for this purpose.

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Practically all of the mines of Parral are now closed except the Alvarado. A large party of Americans has recently come out of the country, under the leadership of Mr. Dufoureq, enduring much hardship on the way. During a part of the journey they were in company with the refugees from Mapimi, which place has been entirely abandoned by foreigners; the mines are filling with water at the rate of 2000 gal. per min. The condition of the refugees in many cases is pitiful. Most of them have lost all their belongings. Some have lost fortunes.

⁂

Mexico has attempted a national election. Ask an American who has lived south of the Rio Grande what a free election will really mean. He will tell you that if the Mexican people, peons and all, voted as they wished, Montezuma would stand a fair chance of receiving a handsome popular majority. Here, by way of example, are the official results of the first primary held in Mexico, so far as is known, says the *Evening Post*. At a mining town in Sonora a visiting American and the resident engineer were talking of Mexican politics. The visitor was somewhat inclined to believe in the applicability of pure democracy to Mexico. The R. E. was skeptical, and more. "I'll call an election for this afternoon and show you," said he. And that afternoon the 500 miners came to the commissary plaza below the hacienda on the R. E.'s orders. He made a speech in grandiloquent Spanish. They loved their country. (No applause, and less understanding.) He wanted to know whom they wanted for el Presidente. He, the R. E., did not want to be elected—this to forestall a unanimous election. They must vote as they wished. They were to file by and speak their wishes. Come. After 15 minutes more the idea permeated the crowd. The miners walked by and mumbled their choice. The official tabulation showed 250 for Larita, the local bull-fighter, a scattering for Lola Mendez, and the balance for Juarez, the Indian president dead now these 40 years.

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Here is the same old story. "When the ore is treated by ordinary cyanide processes so much gold is lost at every stage that only a fraction of the total value is recovered, whereas by my process I have recovered from four-ton parcels of ore as much as 12 times the assay value, as indicated by ordinary fire tests, and never less than four times as much. Ore, assaying 4 dwt., gave from 16 dwt. upward when operating on Pine Creek ores." This from an Australian contemporary that ordinarily knows better.

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The results of sanitary measures in minimizing the effect of malaria and other diseases in the Canal Zone are justly famous, and while the economic benefits of working under healthy conditions are well recognized, it is often supposed that the elaborate methods adopted on the Canal are too expensive for industries working on a smaller scale in remote situations and with limited capital. In the *Scientific American*, Sept. 15, 1913, Dr. J. H. Verloop outlines the results obtained in a successful attempt to decrease malarial sickness on the Guiana placer mine in Dutch Guiana. The methods adopted started on the principle that the mode of life would have to be radically altered. The large extent of surrounding swamp and drowned forest made chemical prophylaxis impossible, and the removal of quarters to a more favorable situation would have been too expensive. For that reason, only the immediate vicinity was kept clean. The houses were built to be light and airy and protected against mosquitoes with gauze in every possible way. The beds were covered with curtains of a special construction and the houses connected by passages also covered with gauze. Supper was taken early and recreation provided so that there was no temptation to leave the quarters in the evening. Special efforts were made to interest the staff in the observance of hygienic laws. Thus, in cases of ordinary sickness, the employees received a higher benefit wage than if stricken with malaria or other preventable diseases. There was also a premium paid for mosquitoes caught indoors. The result was that everbody watched results with interest and enthusiasm. The cost of surplus wages and salaries and of the gauze for the protection of the building was a low premium to pay for insurance against disease. While the overcoming of naturally careless habits necessitated the exercise of a great deal of will-power, the results were well worth the efforts. The health of the 12 to 18 Europeans was largely improved and malaria was no longer greatly dreaded. The company reaped the benefit of steady work under less disturbed conditions.

PERSONALS

J. R. Finlay has just returned to New York, where he will remain about 10 days.

D. de Vries, a well known Dutch engineer, is making a tour through the United States to study our iron and steel plants.

Frank E. Getts recently engineer with the General Electric Co., has taken charge of the Chicago office of the Alberger Pump & Condenser Co., of New York.

Alex. H. Smith has been placed in charge of the Teck-Hughes mine, Kirkland Lake, Ont., in place of John Reddington, who resigned to attend to his other interests.

Ralph Roseberry, lately manager of the Amphitheatre Gold Mining Co., at Leadville, Colo., has accepted the managership of the Bessie Cora Co., and the McCulloch Mines Co., at Montezuma, Colorado.

Charles M. Schwab, president of the Bethlehem Steel Co., has returned from Europe, where he went to complete the transactions relating to the acquisition of the Tofo iron mines in Chile by the company.

J. S. Frazier, recently superintendent of blast furnaces at the Clairton works of the Carnegie Steel Co., has been appointed superintendent of furnaces for the Pittsburgh Steel Co., at its Monesson plant.

John Fulton, the eminent mining engineer and expert on coke, recently celebrated his 87th birthday, at his residence at Johnstown, Penn. Mr. Fulton has retired from active work, and is now writing his recollections. His many friends hope that his life will be prolonged for years.

Thomas M. Kekich has recently resigned his position as assistant superintendent of the Chicago plant of the Great Western Smelting & Refining Co., and has taken an engagement with the Spassky Copper Mines, Ltd., in Siberia. Mr. Kekich has been at different times with the Boston & Montana and the Anaconda mines in Butte, the Cerro de Pasco in Peru, and the Teziutlan Copper Co. in Mexico.

W. J. Loring, of the firm of Bewick, Moreing & Co., was a recent visitor to the properties under development by the California Exploration Co. at Plymonth, Amador County, Calif. Mr. Loring was once superintendent at the Plymouth Consolidated when it was one of the large producers of the Mother Lode region. He was also with the Utica at Angels and the Melones in the Angels Camp district in the early days.

OBITUARY

William Maughan died at Blackhawk, Colo., Oct. 15, aged 59 years. He had been for many years engaged in the smelting industry at first in the old Golden works and for several years past in the Chamberlain Sampling works at Blackhawk.

John S. Fackenthal died at Easton, Penn., Oct. 22, aged 51 years. He was born and brought up in the neighborhood of Allentown, and had been nearly all his active life engaged in the iron industry. He had been with the Thomas Iron Co., at Hokendauqua, and had been superintendent of the blast furnaces at Glendon, Penn., and at Pequest, N. J. He was also for several years connected with the works of the Consolidated Lake Superior Co., at Sault Ste. Marie.

James Putnam Kimball died at Cody, Wyo., Oct. 23, aged 77 years. He was born in Salem, Mass., and was educated at the Lawrence Scientific School of Cambridge, Mass., and also studied at the Universities of Berlin and Göttingen. He was well known as a chemist and geologist, and had held professorships at the New York Agricultural School, and Cornell University. He was also for some time connected with the United States Mint.

SOCIETIES

American Electro Chemical Society—The next meeting of the New York section will be a joint one with the New York section of the American Institute of Mining Engineers and will be held on the evening of Nov. 20. A large attendance is promised. The subject for the evening is the metallurgy of zinc, and three papers will be read: "Progress in the Metallurgy of Zinc," by George C. Stone, metallurgist of the New Jersey Zinc Co.; "The Electric Smelting of Zinc Ores," by W. R. Ingalls; "The Electrolytic Refining of Zinc," by Victor Englehardt, chief engineer of the Siemens-Halske Co. Following these papers there will be a general discussion on the subject, several gentlemen familiar with the questions having promised to take part. It is expected that the discussion will be an interesting one, as there are many conflicting

NEW PATENTS

United States patent specifications may be obtained from "The Engineering and Mining Journal" at 25c. each. British patents are supplied at 40c. each.

SLIME-DEWATERING GRAVITY DEVICE. Ira F. Monell, Boulder, Colo. (U. S. No. 1,074,192; Sept 30, 1913.)

ELECTROMETALLURGICAL PROCESS OF REDUCING METALLIC OXIDES. Dorsey A. Lyon, Palo Alto, and Edwin R. Cox, Jr., Heroult, Calif. (U. S. No. 1,075,295; Oct. 7, 1913.)

METAL BRIQUETS—Composition of Matter for Making Briquets of Fragments of Metal. Charles G. Alton, Hartwell, Ohio. (U. S. No. 1,075,135; Oct. 7, 1913.)

ORE TREATMENT—Apparatus for the Treatment of Ores. George Mitchell, Los Angeles, Calif. (U. S. No. 1,074,282; Sept. 30, 1913.)

WHITE LEAD—Process of Producing White Lead. Edwin Euston, St. Louis, Mo. (U. S. No. 1,075,143; Oct. 7, 1913.)

LEACHING—Cyclic Process of Extracting Metals from Cupriferous Materials. Albert David, Brooklyn, N. Y., assignor to Midland Ores & Patents Co., New York, N. Y. (U. S. No. 1,075,093; Oct. 7, 1913.)

CYANIDING—Process of Preparing a Precious Metal-Dissolving Means. Hans Foersterling, Perth Amboy, N. J., assignor to the Roessler & Hasslacher Chemical Co., New York, N. Y. (U. S. No. 1,076,006; Oct. 14, 1913.)

HARDENING—Case-Hardening Material. Hugh Rodman, Edgewood, Penn., assignor to Rodman Chemical Co. (U. S. No. 1,076,235; Oct. 21, 1913.)

ALUMINUM ALLOY and Method of Producing the Same. William A. McAdams, Bay Shore, N. Y. (U. S. No. 1,076,137; Oct. 21, 1913.)

RADIOTHORIUM—Preparation of Radiothorium. Lise Meitner, Berlin, Germany, assignor to Dr. O. Knöfler & Co., Berlin-Plötzensee, Germany. (U. S. No. 1,076,141; Oct. 21, 1913.)

TIN—Apparatus for Preparing Tinned Sheet-Iron Boxes, Etc., for Detinning. Hans Goldschmidt, Essen-on-the-Ruhr, Germany, assignor, by mesne assignments, to Goldschmidt Detinning Co., Jersey City, N. J. (U. S. No. 1,075,781; Oct. 14, 1913.)

TITANIUM—Method of Raising the Alloying Qualification of Titanium. Hans Goldschmidt and Otto Weil, Essen-on-the-Ruhr, Germany, assignors to the firm of Th. Goldschmidt, Essen-on-the-Ruhr, Germany. (U. S. No. 1,075,782; Oct. 14, 1913.)

TUNGSTEN—Method of Rendering Insufficiently-Ductile Metals Ductile. Carl Trenzen, Cologne-Braunsfeld, Germany. (U. S. No. 1,074,993; Oct. 7, 1913.)

PYRITES—Tilting Furnace for Smelting Pyrites and Sulphur Ores. Emil Knudsen, Mühlbach, Austria. (U. S. No. 1,015,214; Oct. 7, 1913.)

DRILLS—Locking Chuck for Rock Drills, Etc. Sanford W. Brothers, Denver, Colo. (U. S. No. 1,075,325; Oct. 14, 1913.)

ROCK DRILL. Corwill Jackson, Madison, Wis., assignor to General Electric Co. (U. S. No. 1,075,424; Oct. 14, 1913.)

ROCK DRILLS—Valved Connection for Rock Drills. Sanford W. Brothers, Denver, Colo. (U. S. No. 1,075,324; Oct. 14, 1913.)

STEAM SHOVELS—Equalizing System for Steam Shovels and the Like. Svante Robert William Mattsson Bager, Milwaukee, Wis. (U. S. No. 1,075,081; Oct. 7, 1913.)

CRUSHING—Disk Pulverizer. Thomas W. Capen, Milwaukee, Wis., assignor to Allis-Chalmers Co., Milwaukee, Wis. (U. S. No. 1,075,192; Oct. 7, 1913.)

CRUSHING—Ore-Treating Machine. Mitts Quenner, Santa Ana, Sonora, Mexico, assignor, by mesne assignments, to Quenner Dry Crusher Co., Douglas, Ariz. (U. S. No. 1,076,061; Oct. 21, 1913.)

CRUSHING—Rock Breaker. Mitts Quenner, Nogales, Ariz., assignor to Quenner Dry Crusher Co., Douglas, Ariz. (U. S. No. 1,076,062; Oct. 21, 1913.)

CRUSHING—Rock Crusher. Thomas L. Smith, Milwaukee, Wis. (U. S. No. 1,075,507; Oct. 14, 1913.)

DRY CONCENTRATING APPARATUS. Arthur Audet, Los Angeles, Calif. (U. S. No. 1,075,959; Oct. 14, 1913.)

SEPARATOR—Ore Separator. Hiram J. Stewart and James S. Tucker, Canton, Okla. (U. S. No. 1,076,397; Oct. 21, 1913.)

CEMENT—Water-Resistant Cement and Process of Making Same. Carleton Ellis, Montclair, N. J., assignor to New Jersey Testing Laboratories. (U. S. No. 1,076,028; Oct. 21, 1913.)

FIREBRICK—Process of Manufacturing Light Fire Brick. Masahide Hanabusa, Tokyo, Japan. (U. S. No. 1,074,618; Oct. 7, 1913.)

MELTING AND CASTING POT. Thomas C. Sheehan, Jersey City, N. J., assignor, by mesne assignments to Automatic Furnace Co., New York, N. Y. (U. S. No. 1,074,901; Oct. 7, 1913.)

EDITORIAL CORRESPONDENCE

SAN FRANCISCO—Oct. 22

The Mineral Production of California in 1912 is reported by the State Mining Bureau to be worth $91,472,385. The leading product in the list of 44 is petroleum, 89,689,250 bbl., valued at $41,868,344. Gold is second, valued at $19,713,478. The copper production was 34,169,997 lb., valued at $5,638,049; zinc, 4,331,391 lb.; silver, $799,584; quicksilver, 20,600 flasks; tungsten ore, 8042 tons; platinum, 603 oz.; lead, 1,370,067 pounds.

The Farmers' and Smelters' Troubles bid fair to be settled. The outlook for a satisfactory termination of the war of the farmers against the smelters in California and other copper-mining states is stated by Dr. J. A. Holmes, director of the U. S. Bureau of Mines, to be more favorable now than at any other time for several years. Doctor Holmes, returning from Alaska, made a third visit to Shasta County, Oct. 18, traveled over the "smoke" belt and conferred with a few farmers, representing the farmers' protective association—a baker's dozen out of about 300 farmers of whom the majority recognize that the miners and smelters and other industrial operators have some rights within Shasta County. The delegation, which was headed by George Baker, vice-president of the association, was unanimous in the declaration that the crops are still being damaged by fumes from the works at Kennett. They told of their losses, the same old story in the same old way; and that in face of the fact which was plain to Doctor Holmes that the farms of the county produced large crops this year, as they have for the past two or three years. The outlook for an early and satisfactory settlement of the complaints of the farmers is encouraged by the fact that only a small delegation representing the farmers' association are still complaining, and that the complainants are among the most prosperous farmers in the county.

DENVER—Oct. 27

The Golden Cycle has not passed into the hands of British buyers, the president of the company says nothing of the kind has occurred and no one has an option on the property.

A Radioscope, or instrument for detecting the presence of radio-active elements in ores, has been invented by a Denver man and experiments are being made with the device by Ainsworth & Sons.

A Battle Between Sheriffs and Strikers was waged for more than 12 hr. in Berwin Cañon at Hastings and in the vicinity of the Colorado & Southern station at Ludlow, Oct. 26. Firing started at three in the morning and continued intermittently until nearly four in the afternoon. One mine guard was killed and, according to union men, one striker is missing. Armed strikers patrol the entire district in the vicinity of Ludlow, and communication with the camps of Cedar Hill, Tollerburg, Berwin, Hastings, Del Agua and Tobasco practically has been cut off. Governor Ammons ordered the mobilization of all the companies of the state militia after a long-distance conference with officials at Trinidad. In his messages to the companies throughout the state, the governor ordered them to be ready to move at an instant's notice. The troops assembled in their armories, and the Colorado & Southern Ry. got trains ready for the immediate movement of the soldiers.

BUTTE—OCT. 22

Bullion Purchases by the U. S. Assay Office at Helena have been stopped by the director of the mint, owing to the fact that Congress failed to pass an appropriation for the maintenance of several western U. S. Assay Offices. The orders direct those in charge of the assay offices to cease purchasing bullion until such time as such appropriation is available. This will necessitate closing the office for an indeterminate period.

In the Pilot Butte Injunction suit brought by the Anaconda company against the Pilot Butte Mining Co. to prevent the latter from working a certain body of ore until its ownership shall be established under the apex law, the hearing which had been set for Oct. 20 under Judge Lynch has been continued to Mar. 2, 1914, by agreement of attorneys. In the meantime, by an agreement between the two companies, no mining will be done by either on the disputed ore.

In the Northern Pacific Case, in which the railroad denies the right of the State of Montana to assess the mineral rights of the former's holdings, which they are selling with the mineral rights reserved, the first round has been won by the state. The demurrer of the state to the complaint of the railroad company instituted to restrain the Park County assessor from assessing these mineral rights, was sustained by Judge Stack, of Livingston. Notice has been given that the case will be appealed to the supreme court, and perhaps to the United States supreme court.

SALT LAKE CITY—Oct. 23

The U. S. Assay Office at Salt Lake has received notification from the treasury department directing it not to receive any more bullion for shipment to the mint or subtreasuries, as the appropriation made by Congress for the payment of shipping charges from Western assay offices has been exhausted.

The Utah Power & Light Co. is developing additional water power along the Bear River. Work has been in progress for some time in constructing canals, large pipe lines, power houses, etc., to utilize the flood waters of the Bear River, which for many years have gone to waste. In dry season the river is so low that a relatively small amount of power is available, and it is partly to conserve and equalize the power that the present work is being done. Two power plants, one at Grace 67 miles from Bear Lake, and the other at Wheelon, 180 miles down the river from Bear Lake, were purchased, when the Utah Power & Light Co. was organized. The power house at Grace is being altered so that twice the power can be generated as at the old plant. A dam 330 ft. wide, with reinforced concrete intake, is being built at Oneida, 34 miles below Grace, and will form a large reservoir. The power house is one-half a mile below the dam. Three and a half miles below Oneida is another large natural reservoir, with an outlet at the Narrows. Another dam with power house is to be built here. At Mink, three miles below, a dam to impound a large amount of storage water, together with a power plant, will be built. The power house at Wheelon will be enlarged, as soon as the work at Grace and Oneida has been completed. The system of power plants at Grace, Oneida, the Narrows and Mink will be so arranged that it will hardly be possible for an accident at any one or two of the plants to cause a shortage of electric power. Two steel-tower transmission lines are to be built from Grace to a substation six miles west of Salt Lake, and work on one of these lines is well under way. The line is to be 135 miles long. The power will be brought at high voltage to the substation, where it will be reduced, and distributed over the company's system, including power to be furnished to the Utah Copper at Bingham, the mills at Garfield, etc. A large amount of money is being spent on the work under way, and upward of 3000 men are employed at the various camps along the Bear River.

CALUMET—Oct. 25

Violation of the Strike Injunction and constant rioting during the last week resulted in Judge O'Brien issuing a writ to the sheriff and deputies to bring before him all violators, and as a result 209 men were rounded up at the Allouez and Mohawk locations Friday morning and taken by special street cars to the courthouse at Houghton. A preliminary hearing was held and an adjournment taken until the following Friday, the men being released on their own recognizance. Mass picketing and small parades was the order of procedure at the various mines, and the men going to work were interfered with and several were badly beaten. In the village of Red Jacket, a clash between the strikers and deputies occurred; 13 men were arrested, and in the afternoon, when they were being arraigned before the justice of the peace, an attempt was made to take them from the deputies and a free-for-all fight ensued. A large number of men are coming into the district daily. A party coming in special coaches attached to the regular Chicago train on the Northwestern line, was stoned by strikers at the Hancock station and nearly all the windows in the train were broken. Last night, as another party was coming in, the train was fired upon. The train was under military guard, which returned the fire, but as far as is known at present, nobody was seriously injured. The railroads of the district

have reported these occurences to the Federal officials and an investigation will be made. The Calumet & Hecla has erected quarters for the men coming in. Nine large buildings are completed, consisting of bunk houses, dining rooms and kitchens. The buildings are well constructed and furnished. A temporary hospital is being erected at the camp. This company has not experienced any difficulty in securing men, and in a short time, a full force of men will be at work. Preparations are being made to take care of men of the subsidiary companies in the same way. The Socialist element, particularly the Finns, who have been conspicuous in the agitation of the labor troubles, will in all probability, be refused further work in this district.

HOUGHTON—Oct. 25

That Labor Will Be Plentiful in the Copper Country by the end of the year is a prevalent belief. Men are coming into the district on every train and the men who come from other mining districts and those that have been secured from employment agencies, including harvest hands and city laborers, are sticking to their jobs. Even the inexperienced workmen who took jobs as trammers in the Calumet & Hecla like the work and are satisfied with the wages and with the conditions under which they work. As far as experienced miners are concerned, there is no difficulty at all in securing plenty of them to work, for the iron mines are making their usual winter layoff in the Michigan and Minnesota ranges and these men are glad to get placed in the copper mines. Then, again the miners who left early in the strike and went to Butte and to other western camps, are coming back just as soon as they can make arrangements to do so, finding that while wages are higher in the other camps the living conditions are not as good and the cost of living is proportionately high. The Finnish socialist is the most to be pitied in the local situation. He is the most easily led of all the workmen. He was the easiest mark for the paid agitator. Now he finds himself without a job, his funds about exhausted, no chance to get a place to work even if he wants it, either in the mines here or in the iron mines, for the iron mines have had quite as much antipathy toward the Finn socialist as the copper mines now have. Hundreds of these Finns reside on farms which they lease from the mining companies at nominal rentals, mostly to men who have worked for the companies in the past. Most of these farmers have been taking an active part in the strike parades and helping the strikers in various ways. When they walk up to the captain's office to get their leases renewed on Jan. 1, 1914, the situation will present an aspect that they are not now enjoying in contemplation. The Superior is the first local mine to get back to normal production. It is now shipping 500 tons of rock per day. This, in view of the fact that the mine is right in the center of the worst disturbances of the entire strike, is a particularly good record.

TREADWELL, ALASKA—Oct. 15

A New Route, states a Dawson dispatch, has been made from Dawson to the International boundary line within 20 miles of Chisana. The first post will be at Donjek, the second at Snag and the third at the boundary.

A Good Trail to Shushanna or Chisana has been found, states George C. Hazelet, who has been in charge of the party locating the new trail from McCarthy on the Copper River Ry. to the Chisana by way of the Nizina and Chisana glaciers. This trail is over the glaciers. The route has been thoroughly staked, and a short and safe route to the goldfields is now available over this trail.

Alaska Juneau Reserves, states President F. W. Bradley, of the Alaska-Juneau Gold Mining Co., are 254,150,000 tons of ore in sight which will pay a profit of $1 per ton. There will be required a working force of 1500 men. The company claims to be able to treat the ore for 80c. per ton, or 60c. per ton less than it is costing the Treadwell. The first of the four stamp mills will be in running order before the first of the year.

The Midas Copper Mine negotiations for the transfer of the mine on Solomon Gulch near Valdez were completed Oct. 1, and the property now belongs to the Granby Consolidated Mining, Smelting & Power Co. The deal was for cash the price paid for the property being $123,000. This group was bonded in 1903 by the Hadley smelter men, but owing to a suit pending for ownership of the property, the Hadley men dropped the bond.

Fire at the Treadwell Mine broke out at 3 a.m., Oct. 11, totally destroying the shafthouse, causing a loss of $40,000. There were a number of narrow escapes during the fire. The last three men had just stepped from the cage when the cable burned off. The cage dropped 4 ft. when the new safety device caught and held. The skip fell to the bottom of the shaft. The firemen battled for an hour before the flames were under control, using 11 streams of water. The hoist adjoining the shafthouse was not damaged. The management announced that the building would not be replaced.

A Coal Reserve in the Bering River field is recommended by Dr. J. O. Downey, disbursing officer of the U. S. Navy, who for more than a year has been studying the Bering River coal fields. He will recommend that the Navy Department ask the Government to create a coal reserve in that field for the exclusive use of the Navy.

CORDOVA—Oct. 14

Latest News from Shushanna, according to a letter from an engineer who recently arrived in Alaska, is as follows: I have met three men who have returned from the Chisana diggings, one of whom just reached Cordova today, having made from Chisana to the Copper River Ry. in four days. Reports, as usual in stampedes, are rather conflicting, but from all I can gather the camp is not likely to compare with Dawson, Nome or Fairbanks as a gold producer. The field is 3800 ft. above sea level, the formations slate and porphyry, and the creeks have formed cañons which widen in places and the flats are covered with gravel about two feet in depth. There is no moss or vegetation to contend with. The latest arrival from there, a man named Erickson, says no mining is being done at present and that work was shut down a month before it was necessary because of weather conditions. He maintains that sluicing could have been carried on all through September, and that mining ceased for some reason at the end of August. He panned some of the best claims and only got 5c. per pan, though he says he knows of much better pans being obtained. On the bench claims, wherever location work had been done he tested the gravel, but could get no colors; but he says none of the cuts reached bedrock so his pannings only went to show the surface bench gravels were barren of gold. In his opinion the camp is not likely to prove suitable for dredges as on a number of the creeks he saw large boulders. There are about 250 people in the camp at present, making preparations to stay for the winter. Erickson says the new comers as a rule do not trouble to test the creeks to any extent, but make haste to secure a lot and get up a log cabin. They are in there for the winter and are preparing to make the best of it until next season, when the camp's possibilities will be definitely known. Owing to changes in the Alaskan mining laws which allow prospectors to stake for friends, legally, only if they hold power of attorney and have recorded the same, there has been some confusion and jumping of claims. Next season is likely to be a good one for the lawyers in and around the Chisana district. A story is already going the rounds of the holder of a placer claim who wanted to utilize it for a townsite. He wanted a legal opinion as to the matter from a member of the legal fraternity in the camp, who first of all demanded $100. Having received this amount he told the claim holder to fire ahead with his townsite. The claim owner called on a well known "judge" with his application and was told it would have to be typewritten. This the "judge" proceeded to do after collecting a fee of $10 from the would-be townsite owner. A young man whose mother lives in Juneau was going into the Chisana over the glacier by way of Scolai Pass and was taken ill, as the result of using some canned stuff. He was met on the glacier by a doctor who was coming out to Cordova and the doctor stopped for a short time and dosed the young man with five pills. The pills were evidently efficacious as the young fellow proceeded on his way. When the doctor reached Cordova he sent a collect message to the mother asking for $100 for medical services to the son, and what is more, received it. The son figures those pills were too high at $20 each and is going to ask for a rebate of about $90. Erickson says that it is pitiful to see the horses that have been taken in over the trail. Many of them have died and others are crippled and dying. A prospector going in from Cordova with a dog team has had some difficulty in getting a team together. He picked up three dogs at Juneau at a cost of $40 but at Douglas and Skagway was unable to get any, although he had impressed the night watchman on the boat into his service and the latter was keeping his eyes open for stray canines when in port. However, anyone owning a good sleigh dog around an Alaskan port at this season of the year knows his value well enough to keep track of him as a rule, though we did hear of one or two mysterious disappearances. Good dogs, well trained and not too old are worth about $50 each. [It will be noticed that our correspondent speaks of the Chisana, not of the Shushanna county. Although we have always referred to it as Shushanna, it now appears that Chisana is preferable.—Editor.]

THE MINING NEWS

ALASKA

A LARGE DREDGE is to be brought from the Iditarod over the ice this winter to the ground owned by Riley & Marston in the Innoko country, and will be ready for operation early next spring.

GLACIER CREEK GOLD MINING CO. (Porcupine)—A successful season has been completed preparing for the installation of a hydraulic-elevator plant to be placed in operation next year. The work this season has been mainly cutting flume lumber, swamping and grading the right-of-ways for flumes and pipe line.

NOS. 3 AND 4 BELOW, DOME CREEK (Dome)—These placer claims have been purchased by Streeten Dockham from Frank Lawson and George Friend. Both claims were formerly big producers and are of interest as being the only ones on the second tier, right limit of Dome Creek that were not involved in the extensive litigation of a few years ago.

U. S. SMELTING, REFINING & MINING CO.—This company has closed options on the Dora, Wagner and Boston Group of claims and the Lemon Creek water right at Juneau. The company will take steps immediately to purchase the Ebner mine as a part of a scheme to work the low-grade gold ores in these properties. D. D. Muir, who is now at the Ebner with Angus Mackay, will be retained in charge of operations.

SPALDING & BRUMBAUGH (Dome)—On this lease on the Wild Rose and Soo claims, owned by the Reliance Mining Co., the mill of three stamps weighing about 250 lb. each has been rebuilt and is being operated with water from the mine. The larger mill on Dome Creek, 2000 ft. from the mine, was run 12 days in August, producing amalgam worth $1000. It is idle at present, but will be started again as soon as sufficient development work renders more ore available than the smaller mill can crush. A change house has been built near the mouth of the shaft. A 50-ton ore bin, equipped with a 7x10-in. Blake crusher is being built at the mine. A new mess house is to be erected as soon as the ore bin is completed. Underground development work is showing up good ore especially in the east ends of the 50-ft. and 100-ft. levels.

VALDEZ CREEK PLACERS—During the season a 1¼-mile ditch of 2500 miner inches capacity was built, 2800 ft. of pipe was laid, a penstock was completed, a by-wash ditch with a length of nearly one mile was dug, a flume was put in and hydraulicking operations were started Aug. 1 on the Tammany claim. In proving the bedrock from 1907 to 1911 more than $160,000 was taken out. Forbes Rickard in 1911 estimated the entire bank would run 94c. per cu.yd. This year hydraulic operations on the face of this bank, cutting the bank back 125 ft., showed in the cleanup an average of $1.50 per cu.yd. where the old workings had previously cleaned the bedrock; 28 hr. piping into the flume averaged about $100 per hr. It is contemplated sending in 6000 ft. of pipe of 36-in. intake with necessary equipment and installing it not later than July 1, 1914, working under a head of 300 ft. This should increase the plant from 1000 to 6000 yd. daily capacity. Bonds for the equipment and work laid out for next season have been underwritten.

ARIZONA

Cochise County

COPPER QUEEN (Bisbee)—It is rumored that the roasting experiments referred to on p. 651, of the "Journal" for Oct. 4, 1913, have given over 80% of water-soluble copper. This was on a porphyry carrying about 2% of copper.

Gila County

INSPIRATION CONSOLIDATED (Miami)—The Miami Industrial Council issued a statement, Oct. 28, to effect that the American Bridge Co., doing steel work on Inspiration concentrator was unfair, paying low wages and warning labor to remain away from plant. American Bridge Co. claims to be paying union scale.

ARIZONA COMMERCIAL (Globe)—A small flow of water was encountered about the middle of October, but thus far no trouble has been expe ienced from it. The third crosscut showed the vein to be 50 ft. wide, carrying ore throughout, although portions of it will have to be hand sorted. The extraction drift is being driven parallel with the vein 25 ft. from it.

SOUTH LIVE OAK (Miami)—The bond on the company's ground expired Oct. 15, and circulars have been issued to the stockholders, stating the assets of the company. The initial cost of the large churn drill used by the company was $6780, with added cost of equipment, freight, etc., bringing the total up to $12,000. The cost of drilling was $3.78 per ft. The drill was left on the last hole and the casing has not been pulled. Mining men of the district say that the ground had already been proved worthless by other drilling.

MIAMI COPPER (Miami)—Plans have been formulated and actual development started for extraction of the Captain orebody. The sinking of the Captain shaft has been completed to the 420 or main tramming level, and a sump has been cut. On the 420 level 1894 ft. have been completed to date. A number of raises have been started from this level to develop the ground. The first sub-level to be opened up will be the 270 and the work on this will begin at the Captain shaft. Diamond drilling has been discontinued for the present. The daily output is averaging 3000 tons of ore, a rate that will be maintained for the present. The additions to the crushing plant are virtually completed.

Greenlee County

TWIN PEAKS (Clifton)—The erection of a 25-ton mill has been begun. Later a cyanide plant will be added. When the mill is in operation, ores from the New Strike claim, which have been shipped to the Shannon smelting works, will be treated in the Twin Peaks mill.

Maricopa County

RELIEF (Phoenix)—The cyanide plant is in continuous operation.

Mohave County

PIONEER (Oatman District)—Ore 8 ft. wide, assaying $30 per ton, has been opened on the 200-ft. level. A mill is to be erected.

HOT TAMALE (Chloride)—The new development tunnel has been driven 400 ft. with excellent results. A large shoot of ore is being opened and work will soon be started on another tunnel lower down. On the Brighter Days tunnel, owned by the same group, some new drifts are being made below old shoots.

Pima County

CLIPPER (Wooley)—Work has been resumed on the Clipper shaft, which is to be sunk an additional hundred feet and then drifts will be driven on the vein.

KELVIN-SULTANA (Kelvin)—Massive chalcocite has been opened in the east drift on the No. 2 vein at the 300-ft. level. The west drift on the same vein and level has passed into the granite where high-grade carbonates and silicates were encountered. Work on the aerial tramway across the Gila River has been begun.

Yavapai County

CONSOLIDATED ARIZONA (Humboldt)—A contract has been made with the Mineral Separation Co. to install a 250-ton flotation plant in connection with the concentrator.

ARKANSAS

Boone County

GEORGIA CRACKER (Zinc)—This mine is being operated by J. W. Sneller.

Marion County

FRISCO (Yellville)—Ore is being shipped regularly.

STAR KILN (Yellville)—William A. Lancaster, of New York, is operating this mine.

Pike County

KIMBERLITE DIAMOND MINING & WASHING CO. (Murfreesboro)—The charter was recently revoked by the secretary of state, but the company has temporarily turned over its holdings to three trustees and has resumed operations. The company has taken its case to the supreme court on the grounds that the act by which the charter was revoked is unconstitutional.

CALIFORNIA

Amador County

GRITO (Volcano)—Preparations are being made for development of this gravel mine, which is believed to be on the same channel from which good pay is being taken in the Grillo.

Butte County

A TIN PROSPECT at Goat Flat is reported to yield ore carrying a fair percentage of cassiterite.

THE NEW CONCRETE DAM AT MAGALIA on Feather River, under construction by P. B. Steifer Mining Co., is expected to be completed by the end of October.

WATER FOR DREDGING is again available in the Oroville and Honcut fields. The Gardella dredge at Honcut is in operation. The Berry Creek mine also is reported to have sufficient water to resume. There is less demand for water for irrigation.

MAMMOTH CHANNEL GOLD MINING CO. (Marysville)—It is reported that plans were presented at the annual meeting for the organization of a new company to proceed with the development of the mine at Magalia. A drain tunnel is said to be a part of the scheme, which will cheapen the cost of working the gravel.

Eldorado County

THE CABLE EQUIPMENT of the Eureka slate quarry on American River at Slatington is reported to have been destroyed by the recent forest fires. The cable tram is three miles long and cost about $50,000 to build eight years ago.

CARPENDAR—A civil suit and a criminal charge have grown out of the disagreements between W. P. Carpendar and son, the owners, and Arthur S. Lyon over possession of the surface holdings. The Carpendars have secured legal possession. Recently Lyon was charged with threatening the life of Bert Carpendar.

Humboldt County

HORSE MOUNTAIN (Eureka)—This copper property, which is being developed, is reported to have passed under a purchase option to a corporation represented by R. B. Harper, of San José, who made an examination of the mine last month. The development done under the direction of David Wilson is said to have disclosed a large amount of copper ores; the cost has been paid by sales of stock.

Inyo County

INYO CERRO GORDO MINING & POWER CO. (San José)—The state water commission has granted the application for taking water from Lone Pine Creek in Inyo County. The company is successor to the Four Metals Mining Co., which had partly developed the power plant.

Kern County

CONSOLIDATED MINES CO. (Randsburg)—The unwatering of the Wedge is contemplated. This mine has yielded high-grade ore in the Rodgers stope.

YELLOW ASTER (Randsburg)—A dividend of $5000 was declared on Sept. 25. This makes a total of $45,000 for the year, and a total of $1,166,789 since incorporation. The poles for the power line from the substation to Old Wells and to the mine are in place. The equipment of the mills and the pumping plant with electric motors will now proceed.

Modoc County

YELLOW JACKET (Highgrade)—A carload of high-grade ore was recently shipped. A second shipment will be made soon.

MODOC (Highgrade)—Ore of high grade is reported to have been disclosed in the 50-ft. level. Drifting on the 100- and 200-ft. levels is in progress.

BIDWELL DISCOVERY (Highgrade)—It is reported that development will be resumed on this property, which was the first to yield high-grade ore in the early life of the district.

Mono County

STANDARD CONSOLIDATED (Bodie)—The office management has been reduced from five to one man, and the miners reduced to 10. It is reported that a deal is under consideration for taking over of the electric-power plant on Green Creek by another corporation, said to be operating at Aurora, Nev. The plant was installed by the Standard 15 years ago.

COLORADO

Boulder County

THE INCREASED DEMAND FOR TUNGSTEN has created renewed activity among the mines and mills of the Nederland district. The Primos mill, which was shut down a few weeks ago, has been started again and a large force of men has been put to work in the mines. The Wolf Tongue Co. is installing on the Travarton ranch a big compressor plant which will supply air for the drills of 11 different mines owned by the company in the immediate vicinity. The compressors will be driven by electric power furnished by the Colorado Power Co. The Boulder Tungsten Production Co. has a large force of men at work getting out ore for its mill, and the Colorado Tungsten Co. mill has also been started again. The Caribou mines which were sold to a Holland company in 1873 for $3,000,000 and are credited with an early day production of $10,000,000, are being reopened by an English company under the management of Henry P. Lowe, of Central City. The entire Caribou Hill is said to have been secured and 50 men are at work. While the mines are being unwatered and put in shape the mill at Nederland will treat dump ore.

Clear Creek County

HOOSAC—It is reported that the mill will be placed in operation in the near future.

BLACK EAGLE—Development has been resumed by lessees McDonald & Welsch. The lower level will be advanced 200 feet.

TERRIBLE-DUNDERBERG (Georgetown)—The ownership of this group of mines, on Brown Mountain, above Silver Plume, has been transferred to the Terrible-Dunderberg Mining & Power Co., which was recently incorporated with capital of $250,000. It is announced that at a meeting of the stockholders, to be held Nov. 1, the capital is to be increased to $500,000, represented by 100,000 shares of a par value of $5. The company has planned an extensive campaign of development, including the sinking of the main shaft several hundred feet and the driving of the 11th, 12th, 13th and 14th levels. It is reported that the new organization has ample funds to carry out its plans. B. C. Catron, Jr., has been appointed resident manager, with offices at Georgetown, Colo.

Gunnison County

GOLD CUP DREDGING CO.—The dredge and power plant has been completed and was put in operation last week.

Lake County

BABY SHAFT (Leadville)—A 22-hp. electric hoist has been installed at this mine, in California Gulch.

NEW MONARCH (Leadville)—A vein has been opened on the fourth level by lessees of the Cleveland shaft, from which they have shipped two cars that netted $900 per car and they have two more carloads ready. The returns are for gold, silver, copper and lead.

San Juan Region

SMUGGLER UNION VS. LIBERTY BELL—This suit, in which the plaintiff company claimed damages for willful trespass and for the willful extraction of ore from its ground was finally determined in favor of the Smuggler-Union. In June last year, a verdict in favor of the plaintiffs in the sum of $403,000 was rendered. The circuit court of appeals last March in St. Louis confirmed the judgment, and lately the supreme court of the United States, on a writ of certiorari, denied a review or any further hearing. The judgment, therefore, as rendered, stands and amounts, with added interest, to about $448,000.

Summit County

RELIANCE GOLD DREDGING CO. (Breckenridge)—The cleanup for September is said to have been about $10,000.

DUNKIN (Breckenridge)—The lessees who made such an extraordinary strike of nuggets of gold this summer, are now said to have cleaned up $20,000 from that one pocket.

Teller County

PORTLAND (Victor)—It is reported that a vein of ore has been opened at a depth of 1350 ft., which is 5 ft. wide, and assays run from $4 to $2000 per ton. A dividend was paid, Oct. 20, at 2c. per share, making a total of $9,397,080 paid to stockholders.

STRATTON'S ESTATE (Cripple Creek)—The properties are now being worked by 30 sets of lessees, not including sublessees, and the production is about 2000 tons per month of ore of a good average grade. Profits thus derived will result in the payment of the regular annual dividend.

GOLDEN CYCLE (Goldfield)—Charles Butters has brought suit against the company charging that the company is using three processes invented by Butters without permission or profit to him. He asks that a perpetual injunction be issued against the company and that it pay the statutory amount of three times the damage suffered by the knowing use of the patent of another.

IDAHO

Coeur d'Alene District

BLACK HORSE (Murray)—This mine, which is noted for its financial troubles, was sold at sheriff's sale for $5800. It has been in a receiver's hands for some time.

OREGON-WASHINGTON R.R. & NAVIGATION CO., it is rumored, is preparing to enter Sunset district; a route from Cañon Creek across the divide into Nine Mile has been investigated.

ALICE (Mullan)—The leasing company operating this mine is shipping four cars of ore monthly. A crew of 20 men is working between the 400 and 600 levels. The grade of the ore is good.

SILVER CLIFF (Lookout)—The company has experienced great difficulty in finding the vein in the lower tunnel. It has been decided to work through the winter and supplies will be hurried in.

HYPOTHEEK (Kingston)—The water shortage has been relieved and the mill is now running two shifts. The ore is coming from the stope on the 700-ft. level. The property will be operated throughout the winter and will ship three tons of concentrates monthly.

BEAR TOP (Murray)—A leasing company is operating this mine which is in the hands of a receiver. The work will be done between the No. 2 and No. 3 tunnels where a block of ground 200 ft. long and 250 ft. high has not been stoped. The compressor has been put in operation and as soon as the mill has been repaired shipping will commence. The lease is on a royalty basis.

RAY-JEFFERSON (Nine Mile)—The ore encountered in the tunnel has widened from a streak to 8 ft., 18 in. of which is shiping ore which will assay 65% lead. The tunnel is in 800 ft. at a depth of 350 ft. A new tunnel will be started 400 ft. lower. Plans are being considered to install a compressor at once and to erect a mill if the lower tunnel strikes ore.

MICHIGAN

Iron

PICKANDS, MATHER & CO. (Marquette)—Work on a new coal dock is soon to be started at Marquette, and the dock will be ready for use next spring. The dock and unloading machinery will cost $100,000, and will be modern in every respect. The piers of one of the old Duluth, South Shore & Atlantic ore docks, which are under lease, will be used for the foundation. The coal will be carried by a belt conveyor to the present storage plant. The old dock has outlived its usefulness. Most of the soft coal that is brought to the port is for the mines of the Marquette range.

BARRON (Humboldt)—The Breitung interests have discontinued mining ore at the Barron mine, throwing about 200 men out of work. Most of the known ore on the property has been removed, but a crew of about 25 men will be employed underground in searching for new orebodies, which are believed to exist. The Barron is the only Humboldt property which has worked for a number of years, and it will not be long before the village will be practically deserted. At present there is not a mine working in Humboldt, Champion or Michigamme, although it is believed that the Imperial at the last named place will resume work shortly.

MINNESOTA

Cuyuna Range

BRAINERD ALMOST HAD A HOLIDAY a couple of weeks ago. No new Cuyuna property entered the shipping lists, but Leslie Bush, of the Philadelphia Athletics came home.

TONNAGE ESTIMATES of the Cuyuna range outputs by accredited authorities show that shipments in 1913 will be between 850,000 to 900,000 tons, made up as follows: Kennedy, 280,000; Armour No. 1, 160,000; Armour No. 2, 200,000; Pennington, 100,000; Thompson, 40,000; Barrows, 12,000; Cuyuna-Mille Lacs, 75,000; and Cuyuna-Duluth, 15,000.

AVAILABLE CUYUNA ORES, according to testimony of Carl Zapfe in the Steel Corporation dissolution suit in New York Oct. 2, amounted to 400,000,000 tons of ore in addition to the properties now being operated. Of this amount, 50,000,000 tons is manganiferous ore. Mr. Zapfe is geologist in charge of the Northern Pacific interests on the Cuyuna range, which company controls the bulk of the tonnage on the South Range of the Cuyuna district and several properties on the North range.

CUYUNA-DULUTH IRON CO. (Ironton)—This company is hoisting 150 tons daily, some of which is going to stockpile and some to Ashland, Wis., via all rail; 75 men now employed.

BARROWS (Barrows)—About 200 tons per day is being hoisted, all of which is being shipped. This will continue until 10,000 tons have been shipped, when product will be put in stockpile.

THOMPSON (Crosby)—Day and night shifts now working. About 300,000 cu.yd. of stripping removed to date of a total of 800,000 cu.yd. When completed the pit will have a depth of 70 ft. No water troubles so far, and the usual ideal Cuyuna range overburden is being encountered.

Mesabi Range

OLIVER IRON MINING CO. (Buhl)—A new underground property is being opened on Section 16, adjoining the Woodbridge, at Buhl. When well opened up this will be one of the largest underground mines on the range.

UNION (Virginia)—This mine, controlled by the Oliver Iron Mining Co., has discontinued shipments for the season, throwing 50 men out of work. The Roberts-Kingston Contracting Co. is stripping the property.

DULUTH, MISSABE & NORTHERN ORE DOCK (Duluth)—About 250 men now employed on construction work at new No. 5 dock; concrete cribwork about completed, except for 500 ft. of outer end of dock. Erection of the steel supports has begun, and sufficient steel is on hand to keep the full force at work all winter. The dock will be completed prior to opening of navigation next season.

OLIVER IRON MINING CO. (Virginia)—Drills being operated by this company on the Higgins No. 2 are proving up some fine ore. Some of the drills are working where the orebody is being traced west across the "forty," while the remainder are working on extensions of the Mesabi mountain. The ore has been known to exist in both places for several years, and the drilling now being done is merely to prove the extent of the deposits.

SULLIVAN (Virginia)—The Oliver Iron Mining Co. is doing development work on the Sullivan property, a short distance northeast of Virginia, and adjoining the Larkin. New buildings were recently erected and a shaft is now being sunk. The orebody is known to be comparatively small, but large enough for mining at a profit. While nothing official has been given out it is believed that it is the intention of the company to start mining this winter, as the shaft will be down within a short time.

MONTANA

Butte District

EAST BUTTE (Butte)—The management has decided hereafter to issue monthly instead of quarterly reports of output.

RAINBOW (Butte)—This company which owns 110 acres of ground adjoining the Butte & Superior holdings on the east, has sunk a shaft on the property to the depth of 750 ft. and will continue to sink to an indefinite distance. A crosscut was driven on the 600-ft. level for development purposes but no ore was discovered.

GAMBRINUS (Butte)—The shaft in the western residential section of Butte has reached a depth of 200 ft. and drifting is being done on that level. A new hoist capable of sinking to a depth of 1500 ft. has been ordered. As soon as it is installed sinking will be continued to the 1200-ft. level before further drifting is undertaken.

BUTTE & LONDON (Butte)—The Rainbow Lode Development Co. controlled by Duluth men is preparing to sink the shaft from its present depth of 1100 ft. to the 1600-ft. level, and there to crosscut to the north and south endlines of the claim. By the terms of the contract the Rainbow will receive 51% of the stock of the Butte & London company for doing the work. An electric hoist and equipment have been ordered which are now en route, and as soon as received the shaft will be unwatered and work commenced.

BULLWHACKER (Butte)—There has been trouble at this property with the pumps and other machinery, which interrupted operations. The management announces that everything has been finally adjusted and that operations are proceeding under normal conditions. During the time the property was in the hands of lessees the ore was taken out through tunnel, but now it has been decided to reopen the shaft, which has not been used for seven years. The shaft is 400 ft. deep. It is intended to sink the shaft down several hundred feet. With the leaching plant in operation the Bullwhacker expects to bring about a large saving as compared with the leasers who averaged $500 a month with the ore treated at the Washoe works.

NEVADA

Clark County

SINGER (Goodsprings)—The new 50-ton mill has been in operation, and shipments of lead concentrate to Salt Lake smelters have already begun. The plant uses the Stebbins dry concentrator in order to make a separation of lead and zinc minerals from limestone gangue. From a head averaging 17% lead, it is claimed that a concentrate is taken off averaging 60%, with an extraction in excess of 80%. The plant is owned by the Howard Mines Co.

Humboldt County

CHARLESTON NATIONAL (National)—The shaft is now down 300 ft. Sinking will be continued.

ROCHESTER HILLS MINING CO. (Rochester)—A dividend of 10c., it is stated, will be paid before the first of the year. The shaft is 250 ft. deep, and drifting is in progress; 50 tons of ore per day is being shipped. A consolidation of the Rochester Mines Co., Nenzel Crown Point, Weaver, and others, it is stated, will be effected, and that a mill for the treatment of the low-grade ores will be built.

Lyon County

MASON VALLEY MINES CO. (Thompson)—Ore receipts at the smelting plant for the week ended Oct. 16, 1913, were as follows: From Mason Valley mine, 2338 tons; from Nevada-Douglas, 1024 tons; from other mines, 1030 tons; total 4392, or a daily average of 625 tons. During the same week five cars of matte were shipped.

NEVADA-DOUGLAS (Ludwig)—Recent development in the Ludwig has exposed ore on the eighth level. In the Casting Copper the 100- and 200-ft. levels are entirely in ore. This shoot has been crosscut and is 42 ft. wide. On Douglas Hill shipping ore is being blocked out on the sublevel, as well as a large tonnage of low-grade ore. The leaching plant, it is stated, will be built at Ludwig near the mine instead of at Hudson, as first stated.

Mineral County

LUCKY BOY (Hawthorne)—This mine will be reopened in the near future. In the meantime the driving of the tunnel will be continued.

FERMINA SARRIAS GROUP (Luning)—This group of 53 claims, belonging to Señora Fermina Sarrias, has been sold, through A. G. James, of Fallon, for $65,000, a cash payment of $4000 having been made. The roads are now being repaired and development will commence in the near future. Two sets of lessees are now at work and other leases will be granted.

YERINGTON MOUNTAIN (Yerington)—The shaft is now 530 ft. deep and crosscutting on the 500-ft. level is in progress. On the 300-ft. level and in the Beach tunnel ore is being stoped and regular shipments are being made. Ore of good grade is being developed in the Lavigne and Azurite tunnels. The shaft will be sunk to the 750-ft. level, and a tunnel 3500 ft. in length, cutting the vein at a depth of 1200 ft., will be driven.

Nye County

PRODUCTION OF TONOPAH MINES in September was as follows: Tonopah-Belmont, 13,000; Tonopah Mining, 13,150; Tonopah Extension, 4847; Montana-Tonopah, 4496; West End, 3948; North Star, 1757; MacNamara, 2387; Jim Butler, 1426; Merger, 2309; Halifax, 225; Midway, 200; total, 47,745; total gross value, $937,720. The production for September shows a falling off of 5437 tons and $108,880 in value due solely to the mills being closed on Labor Day and from 2 to 2½ days after an account of lack of water and interruption in electric-power service.

Washoe County

A DISCOVERY OF GOLD-SILVER ORE has been made near Jumbo, on the west slope of Mount Davidson. The ore closely resembles that of the Comstock Lode.

White Pine County

STEPTOE VALLEY (McGill)—Two men were burned to death and four others received minor injuries when an explosion occurred in the smokestack Oct. 21. The men were lining the interior of a new stack. A gasoline torch exploded. A. A. Ellis and a Greek laborer were on a platform in the stack 25 ft. from the ground and were burned to death. Although the other men were within the stack, they escaped with slight injuries.

NEW MEXICO

Colfax County

AN EXPLOSION at the No. 2 Stag Cañon colliery of Phelps, Dodge & Co., at Dawson, Oct. 22, occurred when 288 men were underground, 27 men were rescued, and 261 are dead or missing. The superintendent was killed by falling roof just after the explosion while on his way out of the mine. Two rescuers lost their lives.

Socorro County

ERNESTINE MINING CO. (Mogollon)—Some time ago a contract was let for crushing the ore, with the result that the daily treatment has increased from 100 to 160 tons a day.

MAUD MINING CO. (Mogollon)—The drifts being driven from 500-ft. level in new shaft are in excellent milling ore. A steam compressor plant was recently placed in commission.

OAKS (Socorro)—The Winze in "B" tunnel of the East End tunnel group has reached a depth of 20 ft. The vein, of a good grade of sulphide ore, averages 3 ft. width at bottom.

TREASURE MINING & REDUCTION CO. (Mogollon)—The mine crew has been increased after a thorough overhauling of the electric hoist, compressor and other equipment. Machine drills are now employed underground. Power is furnished by the company's hydro-electric plant on Whitewater Creek.

SOCORRO MINING & MILLING CO. (Mogollon)—About a year ago the company started milling the old ore dump accumulated during the bonanza days of the property in the late '90s. It has yielded something like 10,000 tons to date of $10 ore, at a cost of but a few cents per ton to put into mill. A considerable portion of the dump remains to be treated. A large daily tonnage is regularly coming from mine.

NORTH CAROLINA

Montgomery County

COGGINS (Eldorado)—A strike of unusually rich, free-gold ore, 8 ft. wide, of silicified slate carrying quartz in seams and stringers, has just been made in a west crosscut at the 250-ft. level at this mine seven miles from Whitney, in Stanly County. Samples across the 8-ft. width of ore show $202 per ton, largely free gold. The ore carries but 4 or 5% pyrite, with much of the ore showing visible coarse and fine gold disseminated throughout the gangue. This property was purchased last May by North Carolina men, who have since been developing and sinking the main shaft from the 200-ft. level to reach a depth of 500 ft.; the present depth being about 280 ft., and installing a 20-stamp mill with Wilfley tables, which will be completed ready for operation in November. This property is about 20 miles northwest from the Iola mine at Candor in Montgomery County, the South's principal producer of gold in 1912 and 1913. Samples at the 100- and 200-ft. levels gave $7.50 average value for an average width of 20 ft. of ore.

NORTH DAKOTA

Ward County

PLANT FOR BRIQUETTING LIGNITE at Minot, North Dakota's first commercial briquetting plant, is about to begin operations, all machinery having arrived and much of it already being in place. The plant, which is laid out after plans by Dean E. J. Babcock, of the North Dakota School of Mines at Grand Forks, is being watched by Eastern owners of North Dakota lignite properties, as heretofore the disintegration of the lignite has prevented its shipment and hence its general use. The success of the plan would mean much to North Dakota, as Pennsylvania and Wyoming coals are now shipped into the state.

OREGON

Baker County

POWDER RIVER DREDGE—This dredge will work all winter. The management has operated the plant daily for the last few years and with good success. The production ranges from $10,000 to $48,000 per month.

Crook County

THE OREGON TRUNK R.R. will take ore cars into the cattle country of Crook County to bring out an accumulated deposit of gold quartz sent into Redmond by teams, a distance of 30 miles, from the placer mines along the Ochoco River.

Josephine County

ALMEDA CONSOLIDATED (Galice)—Receiver Burley has closed down the smelting plant after operating it since Aug. 21, the date of the receivership. He has come to the conclusion that it is impossible to operate the works with any margin of profit, as it is only by the strictest economy that it can be made to pay more than the running expenses. Burley has left Superintendent John Ross and a crew of men at the mine to make tests by which the selection of the concentrators required will be made. Since operating the mine the receiver, like Mr. Ross, is of the opinion that 30% of the ore is smelting and 70% concentrating ore. Since Aug. 21 the smelting plant has made $14,000 worth of matte, but it was only by the strictest economy that it showed a small margin of profit. The item of hauling had been reduced something over 70% by the use of an automobile truck, which hauled matte to the railway station at Merlin, a distance of 17 miles.

SOUTH DAKOTA

Lawrence County

SILVER GROUP—Local men are arranging to start a systematic course of development on this property, consisting of 135 acres adjoining the Wasp No. 2 and Bismarck on the south.

WELLS FARGO (Terry)—This property, owned by the Golden Reward company, is being operated under lease, by Norman & Bates. Steady shipments of mill ore and occasional lots of smelting grade are going forward.

HEIDELBERG—Now that the new road to this property has been completed, shipments to the Golden Reward mill will commence. There is considerable ore on the dumps, and mine work is yielding a satisfactory tonnage.

TITANIC—Since the installation of a new air compressor and steam hoist, progress at this property has been augmented. The principal work is being confined to the Combination shaft, where sinking is in progress below the 100-ft. level. On the 100-ft. level exploratory lateral work is under way.

UTAH

Beaver County

SOUTH UTAH MINES & SMELTERS (Newhouse)—During September there were produced 249,323 lb. copper, this being the largest output since May, 1912. Operations were suspended in September, 1912, owing to a strike, and work was not resumed until April of this year. Between Apr. 1 and Oct. 1 the production was 1,151,476 lb. copper.

Juab County

TINTIC SHIPMENTS FOR THE WEEK ended Oct. 10 were 128 cars.

EAGLE & BLUE BELL (Eureka)—The fourth quarterly dividend of 5c. was declared Oct. 20, and totals $45,000, payable Nov. 1.

Piute County

WEDGE (Marysvale)—This property in the Horse Heaven country of the Marysvale district has recently made a shipment of rich gold ore. This came from a 2-ft. vein about 60 ft. from the surface. The Wedge has produced chunks and boulders of specimen ore running especially high in gold.

Salt Lake County

UTAH METAL (Bingham)—The difficulties over the water question with the Middle Cañon Irrigation Co. have been settled by the Utah Metal agreeing to pay for the privilege of taking water from the springs above the tunnel, and supplying the irrigation company with an equivalent amount of water from the tunnel.

Summit County

PARK CITY SHIPMENTS for the week ended Oct. 17 amounted to 3,012,230 pounds.

Tooele County

CONSOLIDATED MERCUR (Mercur)—The last of the mine and mill equipment has been sent to Salt Lake City, leaving little of value at the property.

Utah County

NEBO HIGHLAND (Nebo Mining District)—A car of ore from this property is on the market, and other shipments are expected to follow. The ore carries lead, zinc and silver, and is of good grade. Development will be carried on throughout the winter.

WASHINGTON

Ferry County

BEN HUR LEASING CO. (Republic)—During August the company shipped to the Trail, British Columbia smelting plant ore, valued at about $24,000. In September the company sunk the Ben Hur shaft from the 500 to the 600-ft. level, shipped a considerable quantity of ore and mined and stored besides 1500 tons, ready for shipment. On Oct. 12, 1910, the leasing company leased the Ben Hur mine from the Ben Hur Mining & Milling Co. for a term of five years. The lessees have sunk the shaft to the 600-ft. level and will have it completed and timbered to the 700-ft. level by Nov. 1. Thereafter the 600 will be made the main working level until it can be ascertained how the oreshoots pitch below it. To that end a crosscut is being driven 120 ft. eastward toward the vein, which will be explored immediately. From a station on the 400-ft. level a crosscut has reached the vein and a drift has been driven 135 ft. north and another 40 ft. south. From the south end a raise has been carried up to the 300-ft. level. On the 300 the vein has been exploited by driving about 500 ft. north and 90 ft. south, and from a point 300 ft. north of the shaft a raise has been put through to the 200-ft. level in good shipping ore, and 1500 tons have been broken assaying $15 per ton. The leasing company has shipped about $200,000 worth of ore, netting about $100,000, which sum has been expended on development and the purchase and instalment of new machinery.

CANADA

British Columbia

GRANBY CONSOLIDATED (Grand Forks)—This company has taken over the Midas mine at Valdez, Copper Queen on Texada Island, and Mamie mine, on Prince of Wales Island, in Alaska. Bonds have also been taken on local properties.

DALY REDUCTION CO. (Hedley)—This company intended to install a 1500-hp. hydro-electric plant on the Similkameen River, but so far, owing to conflictions, has been unable to get the necessary rights from the government. Everything at the property is running along about as last year, with a slightly increased tonnage, and about the same surplus and dividends.

LUCKY JIM (Kaslo)—A stockholders' meeting, to be held at Victoria, has been called Nov. 13, for the purpose of reorganizing and refinancing the company. Two plans have been made for the owners to consider. One is to reincorporate under the provincial laws and levy an assessment of 5c. per share, to be called at the rate of 1c. per month. The other is to issue bonds. Pressing liabilities of the company are now placed at $83,250. G. Weaver Loper, who financed the corporation originally, is said to be a creditor to the extent of a further $73,000, but this amount the officers say does not come due until the mine is paying 1% per month to the shareholders. The mine cannot be operated profitably without a concentrator, they state, which will cost $150,000. The question of raising this amount additional will be put up at the meeting.

Ontario

BELLELEN (South Lorrain)—This mine has been closed down owing to financial difficulties.

LUCKY CROSS (Swastika)—Operations on this property have been resumed. An electrical power plant will be installed, taking electricity from either the White or the Raven Rivers. A 30-day run will be made to test the best plan of cyaniding the ore.

PORCUPINE MIRACLE (Langmuir Township)—This company is building a 60-ton mill comprising crushing, ball mill and straight amalgamation equipment. A cyanide plant will be put in later. The company has a large quantity of milling ore claimed to average over $11 per ton.

MEXICO

Sonora

SILVER KING (Nacozari)—John G. George, the owner of this mine, has given a bond and lease to J. V. Fryer, who has also secured a lease on the adjoining property. This is one of the old producers in the district and has been worked by the highgraders since it was closed down last year.

WASHINGTON (Uepac)—Development work is being pushed by F. O. Bostwick, manager of the mine and large bodies of ore are being blocked out. Owing to the unsettled conditions of the country no ore is being shipped, but when things are again normal the mine will be in shape for steady shipments.

LA REINA (Esqueda)—Work is being started preparatory to building a small mill. The ore is a sulphide of iron and lead, with quartz containing gold. It is intended to concentrate the ore, after it passes over plates which will get a large portion of the gold. The lead-iron concentrates will be shipped to El Paso.

SANTA ROSA (Cabullona)—Mr. England, who has secured a lease on all James Kirks properties in the district, has become associated with H. F. Brown and others, of Douglas, Ariz., and they are now mining some of the high-grade ore which contains 20% copper. The Santa Rosa is 15 miles southeast of Douglas and six miles east of Cabullona on the Nacozari R.R.

SAN SABA (Cabullona)—Barisic & Vinnie, who are the owners of this property, have recently incorporated both in Mexico and the United States, and have again started to work both in the shaft and on the new crosscut tunnel, which will cut the shaft at the 100-ft. level. The ore can then be taken through this crosscut to the road, saving the expense of hoisting it up the shaft and packing it down the hill again to the wagons.

PERU

Piura

LONDON & PACIFIC PETROLEUM CO., LTD. (Negritos)—It is reported that the Standard Oil Co. has acquired control of the Negritos oil fields. Standard Oil has also a controlling interest in the West Coast Fuel Co., a distributing concern, which has heretofore handled the greater portion of the output of the Lobitos oil fields. The Lobitos fields proper now yield 80,000 tons annually, the chief market being in Peru, Chile and California. The Talara and Negritos fields, operated by the London & Pacific Petroleum Co., and which have now come under the dominion of Standard Oil, produce 100,000 tons annually. They lie about 40 miles along the coast to the northwest of Paita, the port of the Department of Piura. Negritos is the center of boring operations and Talara, an excellent harbor connected with it by 16 miles of narrow-gage railway, is the location of the refinery and shipping wharves. Besides the oil from the wells scattered about Negritos or the ocean side of the property, operations are also carried on at La Brea, 35 miles inland.

THE MARKET REPORT

METAL MARKETS

NEW YORK—Oct. 29

The little excitement in copper last week seems to have passed over for the present, and the market is quieter. Other metals are also inclined to be quiet, with few changes.

Copper, Tin, Lead and Zinc

Copper—The promise of an increasing volume of business at the close of our last week failed to be borne out. American buyers did not come into the market and orders from Europe dwindled. There was an early show of strength, during which close to the asked price of 16⅞c., delivered, 30 days, was realized on some small business. At the same time sales in Europe as high as £78¼, equivalent to about 16.93c., were reported. These were on orders filled out of stock in Europe, representing the necessities of some buyers who had to have immediate copper, and were relatively small in volume. Business for shipment from this side was taken at lower prices right along.

The failure of any important American orders to materialize, coupled with authentic news of relaxation in the brass trade in Connecticut and elsewhere, the mills being reported as running on reduced time, produced a distinct weakening in the attitude of several sellers. Some considerable business was accepted from domestic consumers on Oct. 27, at 16.65@16.70c., delivered, 30 days, while some orders for shipment to Europe were taken at prices that netted scarcely 16.45c. Subsequently there were offers by first hands to sell at 16⅝, delivered 30 days, and at 16.65c. c.i.f. Europe. The largest producers have, however, stood firmly by their asked price of 16⅞c., delivered, usual terms. A significant feature of the week has been offers to deliver copper from seaboard refineries to inland points that ordinarily are noncompetitive.

The situation in Lake copper remains about as last reported. Barring some small quantities the only important supply is in the hands of one producer. This is understood to have been booking to its customers at 17¼c. The price for Lake copper is wholly out of tune with the general market, but special conditions exist, as is well known.

There seems to be still a supply of casting copper on hand which does not find ready buyers.

Speaking generally, there is exhibited some fear that consumption is falling off, both in Europe and in America, and particularly in the brass and sheet trades. This is thought to explain the apathy of buyers in the face of the continued strong statistical position. Reports respecting business in rods and wire are mixed. The electrical business, without doubt, continues excellent, both here and abroad.

At the close the market is very dull. We quote Lake copper at 16¾@17¼c.; and electrolytic in cakes, wirebars or ingots at 16.45@16.50. Casting copper is quoted nominally at 16@16¼c. as an average for the week.

The London standard market closed on Thursday, Oct. 23, at £74 for spot and £73 7s. 6d. for three months. Spot advanced 10s. the next day and further 10s. on Monday, when it was quoted £75 for spot, while the three months quotation remained at £73 10s. The backwardation emphasizes the scarcity of spot material, and the three months quotation the skeptical attitude of speculators regarding the further course of the market. On Wednesday, Oct. 29, spot closed at £74 5s. and three months at £73 7s. 6d. per ton.

Base price of copper sheets is now 22c. for hot rolled and 23c. for cold rolled. Full extras are charged and higher prices for small quantities. Copper wire is 17½@18c., carload lots at mill.

Exports of copper from New York for the week were 6815 long tons. Our special correspondent gives the exports from Baltimore for the week at 2790 tons.

Tin—The firmer tone of the market, to which we alluded in our last report as becoming manifest the middle of last week, brought out considerable inquiry on the part of consumers for forward delivery of the metal. As, however, sellers had withdrawn their previous low offers and even raised their quotations above the London parity, no business resulted. Since then the market relapsed into dullness, only to become active on Oct. 28 inst. at the expense of values. The close is steady at £183 15s. for spot and the same for three months.

Lead—At the lower figures which have recently been established more business has been done, and the market is slightly firmer at 4.35c. New York and 4.20c. St. Louis.

At London Spanish lead is £20 7s. 6d. and English £1 higher.

Spelter—Consumers having permitted their stocks to run down and the price of the metal having gone off considerably of late, a good inquiry made its appearance during the past week and a fair volume of business was transacted at somewhat higher prices. At the close the market is firmer at 5.20@5.25c. St. Louis and 5.35@5.40c. New York.

The foreign market is quoted at £20 10s. for good ordinaries and specials 7s. 6d. higher.

The base price of sheet zinc in carload lots is now $7.50 per 100 lb. f.o.b. cars Peru, Ill., less 8% discount.

DAILY PRICES OF METALS

NEW YORK

Oct.	Sterling Exchange	Silver	Copper		Tin	Lead		Zinc	
			Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cts. per lb.	New York, Cts. per lb	St. Louis, Cts. per lb.	New York, Cts. per lb.	St. Louis, Cts. per lb.
23	4.8525	60½	*16½	16.60	40½	4.35	4.20	5.30	5.15
			@17½	@16.70				@5.35	@5.20
			*16½	16.60				5.35	5.20
24	4.8525	60½	@17½	@16.70	40½	4.35	4.20	@5.40	@5.25
			*16½	16.55				5.35	5.20
25	4.8510	60	@17½	@16.60	40½	4.35	4.20	@5.40	@5.25
			*16½	16.45				5.35	5.20
27	4.8510	60¼	@17½	@16.55	40⅜	4.35	4.20	@5.40	@5.25
			*16½	16.45				5.35	5.20
28	4.8515	59¾	@17½	@16.50	40	4.35	4.20	@5.40	@5.25
			*16½	16.45				5.35	5.20
29	4.8545	59½	@17¼	@16.50	40	4.35	4.20	@5.40	@5.25

*Nominal.

The quotations herein given are our appraisal of the market for copper, lead, spelter and tin based on wholesale contracts with consumers without distinction as to deliveries; and represent, to the best of our judgement, the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. below that of electrolytic. We quote casting copper at 0.15@0.20c. below the price for electrolytic. The quotations for lead represent wholesale transactions in open market for good ordinary brands, both desilverized and nondesilverized; the specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium. Silver quotations are in cents per troy ounce of fine silver.

LONDON

Oct.	Silver	Copper				Tin		Lead		Zinc	
		Spot		3 Mos.	Best Sel'td	Spot	3 Mos.	£ per Ton	Cts. per Lb.	£ per Ton	Cts. per Lb.
		£ per Ton	Cts. per Lb.								
23	27 13/16	74	16.08	73⅜	80	184⅜	185⅜	20¼	4.40	20½	4.45
24	27⅞	74½	16.19	73¼	79½	184⅜	185⅜	20¼	4.40	20½	4.45
25	27⅞	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	27 13/16	75	16.29	73½	80½	184	184½	20⅜	4.43	20⅜	4.48
28	27⅞	74⅞	16.24	73½	80	182½	183½	20 7/16	4.45	20⅜	4.48
29	27½	74½	16.13	73⅜	80	183⅜	183⅜	20⅜	4.43	20½	4.45

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. except silver which is in pence per troy ounce of sterling silver, 0.925 fine. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. Lead prices are for soft Spanish; Zinc prices for good ordinaries. For convenience in comparison of London with American prices, the ratio is: £1 per ton = 0.2173c. per lb., approximately. Cols., 3, 9 and 11 give the equivalent in cts. per lb. of the London price.

Imports and Exports in Great Britain of metals other than iron and steel are reported as follows for the eight months ended Aug. 31, in long tons, except quicksilver, which is in pounds:

Metals	Imports 1912	Imports 1913	Exports 1912	Exports 1913
Copper	86,824	91,499	37,148	46,411
Tin	27,658	30,275	30,476	29,527
Lead	138,651	136,704	35,799	40,924
Zinc	100,176	100,686	6,222	6,573
Quicksilver, lb.	3,338,867	3,151,442	1,472,163	1,552,431
Minor metals	5,038	6,008	17,497	18,452
Ores, etc.:				
Tin ore and concentrates	19,690	23,638	.....	.....
Pyrites	595,047	552,422	.....	.....

Copper includes metal contents of ores, matte, etc. Exports include reëxports of foreign material.

Other Metals

Aluminum—The market is dull for spot metal, and prices are lower, 19½c. per lb. being quoted for No. 1 ingots, New York. The London market has declined rather sharply, the latest quotation received being £81 per long ton—equal to 17.6c. per lb.—for ingots.

Antimony—Business has been very good and considerable buying is reported both for current supplies and for stock. Prices are a little higher. Cookson's is quoted at 7.60@7.70c. per lb.; Hallett's 7¼@7⅜c.; while 6½@6¾c. per lb. is paid for Chinese, Hungarian, and other outside brands.

Quicksilver—Business is somewhat better than it has been recently, and prices are generally steady. The New York quotation is $38.50 per flask of 75 lb. with 56@57c. per lb. for retail lots. San Francisco price is $38.50 per flask, with special terms for export business. The London price is £7 5s. per flask, with £7 quoted from second hands.

Magnesium—Current price of pure metal is $1.50 per lb. for 100-lb. lots, New York.

Nickel—Quotations for ordinary forms, shot, blocks or plaquettes are 40@45c. per lb., according to size of order and quality. Electrolytic nickel is 5c. per lb. higher.

Selenium—For large lots, 100 lb. or over, $3@3.25 per lb. is quoted; while $5 per lb. is paid for retail orders.

Exports from Baltimore for the past week included 330 lb. selenium.

Gold, Silver and Platinum

Gold—The price of gold on the open market in London was unchanged at 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. There was less demand for Egypt and India, but Germany is still looking for gold.

Iridium—Demand is fair and prices steady. Dealers ask $83@85 per oz., New York.

Platinum—The market is firmer and there seems to be less metal offering at lower prices. Quotations are still $44@45 per oz. for refined platinum. Hard metal is steady, $49@52 per oz. being asked. The foreign market is reported firmer than it has been lately.

Silver—Owing to over-speculation in India, coupled with reports from the northwest of India of the rather unfavorable Monsoon, causing uncertainty in regard to further requirements of the India Government, silver has had a reaction and the market even at the decline does not yet look settled.

Shipments of silver from London to the East, Jan. 1 to Oct. 16, as reported by Messrs. Pixley & Abell:

	1912	1913	Changes
India	£8,591,500	£8,145,000	D. £ 446,500
China	993,500	702,000	D. 291,500
Total	£9,585,000	£8,847,000	D. £ 738,000

The stocks of silver in London are estimated at £1,800,000, which is £750,000 less than at the corresponding date in 1912. Stocks at Bombay are £435,000, a decrease of £1,375,000. On the other hard stocks at Shaughai are reported to be £6,235,000, or £2,935,000 more than last year.

Gold and Silver Movement in the United States nine months ended Sept. 30:

	Gold 1912	Gold 1913	Silver 1912	Silver 1913
Exports	$43,728,274	$74,079,279	$52,347,946	$49,022,237
Imports	38,789,793	46,199,608	36,301,752	27,430,312
Excess, exp.	$4,938,481	$27,879,671	$16,046,194	$21,591,925

Merchandise exports for the nine months this year were valued at $1,733,367,608; imports, $1,325,868,152; excess of exports, $407,499,456. Adding the gold and silver gives $456,971,052 as the total export balance.

Zinc and Lead Ore Markets

PLATTEVILLE, WIS.—Oct. 25

The base price paid this week for 60% zinc ore was $42 per ton. The base price paid for 80% lead ore was $55 per ton.

SHIPMENTS WEEK ENDED OCT. 25

	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Week	2,173,390	175,330	1,024,960
Year to date	121,048,420	5,652,670	48,289,800

Shipped during week to separating plants, 2,689,850 lb. zinc ore.

JOPLIN, MO.—Oct. 25

The high price of zinc blende is $45, the base per ton of 60% zinc ranging from $40@42 for choice grades. Toward the week-end medium grades were forced to a level of the best by keen competition and heavy purchases were made mostly for future delivery. Calamine continues unaffected by the declining blende market and is quoted strong at $21@23 per ton of 40% zinc. The average of all grades of zinc is $40.04 per ton. Lead ore is unchanged at $52 per ton of 80% metal content. The average of all grades of lead is $51.22 per ton.

SHIPMENTS WEEK ENDED OCT. 25

	Blende	Calamine	Lead	Value
Total sales this week	10,118,510	950,890	1,541,420	$261,045
Total sales 10 months	469,009,400	34,567,040	77,380,920	$12,780,584

Blende value, the week, $209,465; 10 months, $11,171,591.
Calamine value, the week, $12,100; 10 months, $445,644.
Lead value, the week, $39,480; 10 months, $2,063,419.

IRON TRADE REVIEW

NEW YORK—Oct. 29

The steel situation has lost more ground in the past week than in any week since the recession in activity began. Production of steel has undergone a considerable decrease, being estimated this week at 80% of capacity, against 85% so recently as last week, and 90% at the beginning of tne month. The prediction is now freely made that within 30 days the mills will be running at about 65% of capacity.

The tariff is not the governing influence in the steel trade, a conclusion forced by the fact that prices show at least as great a declining tendency in the great inland market centering in Chicago as they do along the seaboard.

Mills in the Pittsburgh district have not greatly reduced their operations, but in the Chicago district and the South there has been considerable reduction, making the average of the country lower compared even with last week, and further curtailment is practically certain, as new orders are averaging only between one-half and two-thirds of capacity.

The United States Steel Corporation reports for the quarter ended Sept. 30 net earnings, after payment of ordinary repairs, renewals and subsidiary company charges, as follows:

HOBART

	1912	1913
July	$9,322,142	$12,936,658
August	10,583,377	12,657,430
September	10,157,993	12,856,312
Quarter	$30,063,512	$38,450,400
Depreciation and sinking funds sub. cos.		$7,130,960
Interest and sinking funds		7,311,962
Total charges		$14,442,922
Surplus for the quarter		$24,007,478
Dividends, 1¾% on preferred and 1¼% on common		12,658,700
Undivided surplus		$11,348,778

PITTSBURGH—Oct. 28

Pittsburgh iron and steel men just returned from the semi-annual meeting of the American Iron & Steel Institute, held in Chicago last week, bring reports that the sentiment of leading manufacturers who gathered in Chicago was less cheerful than was expected. The interchange of views

seemed to depress rather than encourage. It may be taken as the concensus of opinion that the trade has entered upon a depression of which the severest part, in the matter of prices and tonnage production, is yet to be experienced, and which will last not less than three or four months as a minimum.

Slight shading of a week or more ago in merchant steel bars had developed into general shading of $1 a ton, making the market quotable at 1.35c., while shapes have lost $1 a ton and are quotable at 1.35c., plates being 1.30c. These quotations represent the average market, there being occasional concessions beyond.

The National Tube Co. in a list dated Oct. 27 has reduced prices on standard steel pipe by $1 to $3 a ton. Black and galvanized sheets are easier, while unfinished steel has undergone a somewhat more marked decline. The Pittsburgh market is now $8 a ton lower than that of early in the year, when there was a virtual famine in unfinished steel.

Pig Iron—Several sales of foundry have been made on the basis of $13.75, Valley, and on light transactions bessemer has declined 25c. Basic is offered at $13.75, with no sales. We quote: Bessemer, $15.50; basic, $13.75; foundry, $13.75; forge, $13.50; malleable, $14, f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

Ferromanganese—English ferromanganese is well held at the former quotation of $50, Baltimore, with $2.16 freight to Pittsburgh, for prompt or forward, but buying is light and is confined to prompt. German ferromanganese is offered in limited tonnages at $49.50, Baltimore, but it is represented that the price is fixed without reference to the English price.

Steel—The market for billets and sheet bars continues to be made by mills adjusting contract prices with their customers, to avoid their going elsewhere, and not by outright sales in the market, of which there are practically none. On this basis we quote billets at $21 and sheet bars at $22, f.o.b. maker's mill, Pittsburgh or Youngstown, noting that lower prices might possibly be done. Rods are about $26, Pittsburgh.

IRON ORE

The movement of iron ore from the Lake Superior region has been delayed by stormy and unusually cold weather. From now on the movement of ore will begin to decrease. There has been some congestion at Lake Erie ports, with consequent delay in unloading.

COKE

The group of Connellsville coke operators who were maintaining the quotation of $2.50 for furnace coke have abandoned the effort and will meet the market. They have already sold 10,000 tons to an eastern steel interest at $1.90 for November shipment. The furnace-coke market is quotable at $2@2.15 for prompt or contract with possiblities of shading.

Coal tonnage of Pennsylvania R.R. lines east of Pittsburgh and Erie nine months ended Sept. 30, short tons:

	1912	1913	Changes
Anthracite	7,387,837	7,665,020	I. 277,183
Bituminous	34,114,059	37,774,323	I.3,660,264
Coke	9,671,343	10,859,413	I.1,188,070
Total	51,173,239	56,298,756	I.5,125,517

The total increase this year was 10%. The largest proportional gain was in coke.

Foreign Fuel Trade of Germany nine months ended Sept. 30, in metric tons:

	Exports	Imports	Excess
Coal	22,473,309	6,364,395 Exp.	16,108,914
Brown coal	40,415	4,717,163 Imp.	4,676,748
Coke	4,502,886	409,956 Exp.	4,092,930
Briquettes	2,137,740	95,146 Exp.	2,042,594
Total	29,154,350	11,586,660 Exp.	17,567,690

Of the briquettes exported in the nine months 554,573 tons were made from brown coal, or lignite. Exports included 15,239 tons of coke to the United States.

CHEMICALS

NEW YORK—Oct. 29

The general markets are rather quiet and business is not especially active.

Arsenic—The market is still very quiet. Supplies are plentiful. Prices are nominally unchanged at about $3 per 100 lb. for white arsenic.

Copper Sulphate—The market is steady and fairly active. Prices are unchanged at $5 per 100 lb. for carload lots and $5.25 per 100 lb. for smaller parcels.

Nitrate of Soda—The market is still dull and unsettled. Prices are unchanged at 2.25c. per lb. for October, 2.30c. for November and December and 2.35c. for January-May delivery.

PETROLEUM

Exports of mineral oils from the United States in September were 190,330,214 gal. For the nine months ended Sept. 30 the total exports were 1,377,144,587 gal. in 1912, and 1,504,779,483 gal. in 1913; an increase of 127,634,896 gal., or 9.3%, this year.

COPPER SMELTER'S REPORTS

This table is compiled from reports received from the respective companies except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield then is reckoned at 97%. In computing the total American supply duplications are excluded.

	May	June	July	August	September
Alaska shipments	1,771,508	2,203,191	2,705,136	1,847,785	2,261,216
Anaconda	25,600,000	21,500,000	22,100,000	22,500,000	22,600,000
Arizona, Ltd.	3,200,000	2,600,000	2,600,000	1,800,000	1,800,000
Copper Queen	8,301,605	7,477,936	8,369,607	8,252,404	.....
Calumet & Ariz.	4,300,000	4,000,000	3,800,000	4,500,000	4,000,000
Chino	3,883,611	3,682,706	4,831,185	6,050,867	4,308,296
Detroit	2,001,633	1,750,601	1,549,224	2,187,223	.....
East Butte	1,268,595	1,055,646	1,060,257	1,162,007	1,233,018
Giroux	839,317	598,240	584,546	524,953	198,178
Mason Valley	1,186,560	1,097,014	908,892	867,060	.....
Miami	1,943,900	2,612,000	.....	.....	.....
Mammoth	1,700,000	1,750,000	1,800,000	1,750,000	1,750,000
Nevada Con.	5,933,275	6,344,863	5,403,919	5,989,973	4,441,671
Ohio	650,071	537,400	601,700	689,000	685,900
Old Dominion	2,749,000	2,511,000	2,526,000	2,524,000	2,679,000
Ray	4,384,400	4,392,612	4,097,000	4,269,519	4,336,434
Shannon	1,080,000	924,000	880,000	1,248,000	1,232,000
South Utah	200,000	185,000	140,000	223,498	241,843
Tennessee	§1,037,115	1,379,220	1,247,804	1,101,019	1,309,950
United Verde*	3,000,000	2,900,000	3,000,000	3,000,000	.....
Utah Copper Co.	10,003,227	11,637,949	9,849,043	10,302,251	11,462,905
Lake Superior*	18,705,000	16,500,000	17,500,000	9,700,000	6,950,008
Non-rep. mines*	6,300,000	6,000,000	6,200,000	6,200,000	.....
Total prod.	109,824,500	104,051,138	101,758,167	96,769,606	.....
Imports, bars, etc.	22,205,942	18,255,267	29,029,990	22,474,471	.....
Total blister.	132,030,442	122,306,405	130,788,157	119,244,077	.....
Imp. ore & matte.	10,528,562	7,497,002	8,527,046	9,171,351	.....
Total Amer.	142,559,004	129,803,407	139,315,203	128,415,428	.....
Miami†	.....	.....	2,890,000	3,097,500	2,688,000
Shattuck-Arizona	1,026,170	1,059,625	1,019,388	1,001,634	1,163,237
Brit. Col. Cos.:					
British Col. Cop.	618,076	634,238	618,379	.....	.....
Granby	1,782,570	1,789,000	1,664,102	1,847,344	1,824,659
Mexican Cos.:					
Boleo†	2,424,800	1,984,640	2,240,720	2,264,640	2,369,920
Cananea	2,272,000	2,908,000	3,328,000	3,186,000	3,148,000
Moctezuma	2,695,881	3,438,793	2,693,006	3,542,047	.....
Other Foreign:					
Braden, Chile	1,150,000	1,804,000	1,046,000	1,572,000	1,332,000
Cape Cop., S. Af.	387,520	414,400	.....	.....	.....
Kyshtim, Russia	1,490,000	1,000,000	2,500,000	1,585,000	.....
Spassky, Russia	721,280	835,520	660,800	1,048,320	.....
Exports from					
Chile	3,584,000	5,824,000	9,856,000	8,736,000	5,600,000
Australia	7,840,000	7,616,000	10,304,000	7,720,000	6,944,000
Arrivals-Europe‡	13,661,760	5,277,440	11,728,640	14,624,960	9,661,120

† Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister. From May 1, Miami copper is refined in the U. S. and appears under American mines. From July 1 Miami ore went back to Cananea.

‡ Does not include the arrivals from the United States, Australia or Chile.

§ In operation only 20 days in May.

STATISTICS OF COPPER

	United States			Visible Stocks.		
Month	U.S.Refin'y Production	Deliveries, Domestic	Deliveries, for Export	United States	Europe	Total
IX, '12	140,089,819	63,460,810	60,264,796	46,701,374	113,568,000	160,269,374
X.	145,405,453	84,104,734	47,621,342	63,065,587	107,408,000	170,473,587
XI.	134,695,400	69,369,795	55,906,550	76,744,964	103,801,600	180,546,564
XII.	143,354,042	58,491,723	65,713,796	86,164,059	96,947,200	183,111,259
Year, 1912	1,581,920,287	819,665,948	746,396,452	.....	.....	.....
I. 1913.	143,479,625	65,210,030	60,383,845	105,312,582	78,491,840	183,904,422
II.	130,948,881	59,676,492	72,168,523	123,198,332	77,504,000	200,702,332
III.	136,251,849	76,585,471	77,699,306	122,302,890	81,244,800	203,547,690
IV.	135,353,402	78,158,837	85,894,727	104,269,270	87,180,800	191,450,070
V.	141,319,416	81,108,321	68,285,978	75,549,108	85,948,800	161,497,908
VI.	121,860,853	68,362,571	68,067,901	67,474,225	77,235,200	144,709,425
VII.	138,074,602	58,904,192	78,480,071	52,814,606	71,904,000	124,808,606
VIII.	131,632,362	73,649,801	73,263,469	53,594,945	66,420,480	120,015,385
IX.	131,401,229	66,836,897	73,085,275	38,314,037	63,716,800	102,030,837
X.	.....	.....	.....	29,793,094	53,625,600	83,418,694

Note—From Jan. 1, 1913, visible supplies in Europe do not include copper afloat.

Assessments

Company	Delinq.	Sale	Amt.
Alameda, Ida.	Oct. 21	Nov. 20	0.0015
Big Elk, Ida.	Oct. 13	Nov. 5	0.001
Carlin-Nevada, Nev.	Oct. 25	Nov. 11	0.001
Cedar Extension, Utah.	Oct. 30	Nov. 17	0.005
Central Eureka, Calif.	Oct. 13	Nov. 14	0.05
Comet, Ida.	Oct. 20	Nov. 20	0.0005
Cop. Mountain, Ida. (postpo'd)	Sept. 6	Nov. 4	0.002
Copper King, Ida(postpon'd)	Sept. 14	Nov. 14	0.01
Crown Point, Nev.	Oct. 20	Nov. 12	0.10
Demijohn Cons., Utah.	Oct. 17	Nov. 4	0.0025
Dennemora, Ida.	Oct. 20	Nov. 20	0.0025
Emerald, Utah.	Oct. 15	Nov. 8	0.005
Eureka, Utah.	Oct. 21	Nov. 11	0.001
Hamburg-American.	July 22	Nov. 9	0.0075
Hypotheek, Ida.	Oct. 9	Nov. 4	0.004
Lewis & Clark, Ida.	Oct. 15	Nov. 18	0.0075
Lost Josephine, Utah.	Oct. 17	Nov. 6	0.002
Lower Mammoth, Utah.	Oct. 17	Nov. 7	0.01
Mont. Pittsburgh Ex., Calif.	Oct. 13	Nov. 8	0.01
Reinder, Ida.	Oct. 20	Nov. 7	0.003
Revenue Cons., Utah.	Oct. 29	Nov. 19	0.005
Spider, Utah.	Oct. 23	Nov. 15	0.0025
Sunset, Ida.	Oct. 18	Nov. 12	0.002
Tar Baby, Utah.	Sept. 29	Nov. 3	0.0025
Utah United, Utah.	Oct. 1	Oct. 30	0.01
Western Star, Ida.	Oct. 23	Nov. 8	0.002
Wisconsin, Ida.	Oct. 9	Nov. 10	0.002

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1911	1912	1913	1911	1912	1913
January	53.795	56.260	62.938	24.865	25.887	28.983
February	52.222	59.043	61.642	24.081	27.190	28.357
March	52.745	58.375	57.870	24.324	26.875	26.669
April	53.325	59.207	59.490	24.595	27.284	27.416
May	53.308	60.880	60.361	24.583	28.038	27.825
June	53.043	61.290	58.990	24.486	28.215	27.199
July	52.630	60.654	58.721	24.286	27.919	27.074
August	52.171	61.606	59.293	24.082	28.375	27.335
September	52.440	63.078	60.640	24.209	29.088	27.986
October	53.340	63.471	.....	24.594	29.299	.....
November	55.719	62.792	.....	25.649	29.012	.....
December	54.905	63.365	.....	25.349	29.320	.....
Year	53.304	60.835	.....	24.592	28.042	.....

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York				London Standard	
	Electrolytic		Lake			
	1912	1913	1912	1913	1912	1913
January	14.094	16.488	14.337	16.767	62.760	71.741
February	14.084	14.971	14.329	15.253	62.893	65.519
March	14.698	14.713	14.868	14.930	65.884	65.329
April	15.741	15.291	15.930	15.565	70.294	68.111
May	16.031	15.436	16.245	15.738	72.352	68.807
June	17.234	14.672	17.443	14.871	78.259	67.140
July	17.190	14.190	17.353	14.563	76.636	64.166
August	17.498	15.400	17.644	15.904	78.670	69.200
September	17.508	16.328	17.698	16.799	78.762	73.125
October	17.314	.....	17.661	.....	76.389	.....
November	17.326	.....	17.617	.....	76.890	.....
December	17.376	.....	17.600	.....	75.516	.....
Year	16.341	.....	16.560	.....	72.942	.....

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN

Month	New York		London	
	1912	1913	1912	1913
January	42.529	50.298	191.519	238.273
February	42.962	48.766	195.036	220.140
March	42.577	46.832	192.619	213.615
April	43.923	49.115	200.513	224.159
May	46.063	49.038	208.830	224.143
June	45.815	44.820	205.863	207.208
July	44.519	40.260	202.446	183.511
August	45.857	41.582	208.351	188.731
September	49.135	42.410	223.762	193.074
October	50.077	.....	228.353	.....
November	49.891	.....	227.619	.....
December	49.815	.....	226.875	.....
Av. year	46.096	.....	209.322	.....

New York in cents per pound; London in pounds sterling per long ton.

LEAD

Month	New York		St. Louis		London	
	1912	1913	1912	1913	1912	1913
January	4.435	4.321	4.327	4.171	15.597	17.114
February	4.026	4.325	3.946	4.175	15.738	16.550
March	4.073	4.327	4.046	4.177	15.997	15.977
April	4.200	4.381	4.118	4.242	16.331	17.597
May	4.194	4.342	4.072	4.226	16.509	18.923
June	4.392	4.325	4.321	4.190	17.588	20.226
July	4.720	4.353	4.603	4.223	18.544	20.038
August	4.569	4.624	4.452	4.550	19.655	20.406
September	5.048	4.698	4.924	4.579	22.292	20.648
October	5.071	.....	4.894	.....	20.630	.....
November	4.615	.....	4.463	.....	18.193	.....
December	4.303	.....	4.152	.....	18.069	.....
Year	4.471	.....	4.360	.....	17.929	.....

New York and St. Louis cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1912	1913	1912	1913	1912	1913
January	6.442	6.931	6.292	6.854	26.642	26.114
February	6.499	6.239	6.349	6.089	26.661	25.338
March	6.626	6.078	6.476	5.926	26.048	24.605
April	6.633	5.641	6.483	5.491	25.644	25.313
May	6.679	5.406	6.529	5.256	25.790	24.583
June	6.877	5.124	6.727	4.974	25.763	22.143
July	7.116	5.278	6.966	5.128	26.174	20.592
August	7.028	5.658	6.878	5.508	26.443	20.706
September	7.454	5.694	7.313	5.544	27.048	21.148
October	7.426	.....	7.276	.....	27.543	.....
November	7.371	.....	7.221	.....	26.804	.....
December	7.162	.....	7.081	.....	26.494	.....
Year	6.943	.....	6.799	.....	26.421	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON IN PITTSBURGH

Month	Bessemer		Basic		No. 2 Foundry	
	1912	1913	1912	1913	1912	1913
January	$15.12	$18.15	$13.32	$17.35	$14.00	$18.59
February	15.03	18.15	13.28	17.22	14.01	18.13
March	14.95	18.15	13.66	16.96	14.10	17.53
April	15.13	17.90	13.90	16.71	14.15	16.40
May	15.14	17.68	13.90	15.80	14.12	15.40
June	15.15	17.14	14.11	15.40	14.22	15.10
July	15.15	16.31	14.38	15.13	14.38	14.74
August	15.43	16.63	14.90	15.00	14.85	14.88
September	16.86	16.65	16.03	15.04	15.63	14.93
October	17.90	.....	17.18	.....	17.22	.....
November	18.07	.....	17.09	.....	18.00	.....
December	18.15	.....	17.45	.....	18.73	.....
Year	$16.01	.....	$14.93	.....	$15.28	.....

STOCK QUOTATIONS

COLO. SPRINGS Oct. 28

Name of Comp.	Bid.
Acacia	.02½
Cripple Cr'k Con.	.01¼
C. K. & N.	.09
Doctor Jack Pot.	.06
Elkton Con.	.53½
El Paso	2.95
Findlay	.02
Gold Dollar	.08
Gold Sovereign	.02½
Isabella	.09½
Jack Pot	.05
Jennie Sample	.05
Jerry Johnson	.03½
Lexington	‡.005
Moon Anchor	‡.006
Old Gold	.01½
Mary McKinney	.54
Pharmacist	.01¼
Portland	.97
Vindicator	.84

SALT LAKE Oct. 28

Name of Comp.	Bid.
Beck Tunnel	.04½
Black Jack	.07
Cedar Talisman	.00½
Colorado Mining	.10
Columbus Con.	‡.01
Crown Point	.00½
Daly-Judge	5.00
Grand Central	.52
Iron Blossom	1.07½
Little Bell	‡.10
Lower Mammoth	.00½
Mason Valley	4.00
May Day	.05½
Nevada Hills	.60
New York	.02½
Prince Con.	.29
Silver King Coal'n	3.82½
Sioux Con.	.01
Uncle Sam	.02
Yankee	.08½

TORONTO Oct. 27

Name of Comp.	Bid.	Name of Comp.	Bid.
Bailey	.07½	Foley O'Brien	.15
Coniagas	6.90	Hollinger	17.00
T. & Hudson Bay	70.00	Imperial	‡.02
Timiskaming	.15	Jupiter	‡.10
Wettlaufer-Lor.	.07	Pearl Lake	‡.11
Apex	‡.01	Porcu. Gold	.08
Big Dome	‡9.75	Preston E. D.	.01
Crown Chartered	‡.00½	Rea	‡.12
Dobie	‡.10	Swastika	‡.02
Dome Exten.	.07	West Dome	‡.08

SAN FRANCISCO Oct. 28

Name of Comp.	Bid	Name of Comp.	Bid
Comstock Stocks		Misc. Nev. & Cal.	
Alta	.08	Belmont	7.70
Belcher	.25	Jim Butler	.62
Best & Belcher	.04	MacNamara	.10
Caledonia	1.85	Midway	.38
Challenge Con.	.09	Mont.-Tonopah	1.07½
Chollar	1.03	North Star	.36
Confidence	.30	West End Con.	1.42½
Con. Virginia	.13	Atlanta	.12
Crown Point	.28	Booth	.02
Gould & Curry	.03	C.O.D. Con.	.04
Hale & Norcross	.06	Comb. Frac.	.03
Mexican	1.20	Jumbo Extension	.09
Occidental	.70	Pitts.-Silver Peak	.40
Ophir	.19	Round Mountain	.39
Overman	.30	Sandstorm Kendall	.07
Potosi	.03	Silver Pick	.03
Savage	.13	Argonaut	3.00
Sierra Nevada	.08	Bunker Hill	1.50
Union Con.	.11	Central Eureka	.15
Yellow Jacket	.31	So. Eureka	2.00

N. Y. EXCH. Oct. 28

Name of Comp.	Clg.
Amalgamated	74½
Am. Agri. Chem.	44
Am.Sm.&Ref.,com.	64
Am. Sm. & Ref., pf.	100
Am. Sm. Sec., pf. B	81½
Anaconda	36
Batopilas Min.	1
Bethlehem Steel,pf.	71½
Chino	40½
Federal M. & S., pf.	38
Great Nor.,ore,ctf.	33½
Guggen. Exp.	45½
Homestake	106½
Inspiration Con.	15½
Miami Copper	22½
Nat'l Lead, com.	44½
National Lead, pf.	102½
Nev. Consol.	15½
Phelps Dodge	188
Pittsburg Coal, pf.	90½
Quicksilver, pf.	3
Ray Con.	18½
Republic I&S,com.	20
Republic I&S, pf.	81½
SlossSheffi'd,com.	29
Sloss Sheffield, pf.	86
Tennessee Copper	28½
Utah Copper	53
U. S. Steel, com.	57½
U. S. Steel, pf.	107
Va.Car.Chem.,pf.	95

N. Y. CURB Oct. 28

Name of Comp.	Clg.
Ariz. Belmont	.12½
Barnes King	1⅛
Beaver Con.	.34
Big Four	.19
Braden Copper	7
B. C. Copper	2½
Buffalo Mines	2
Can. G. & S.	.19
Caribou	.59
Con. Ariz. Sm.	7/16
Coppermines Cons.	3
Davis-Daly	1½
Diam'field-Daisy	.02
Ely Con.	.06
Florence	.23
Gold Hill Con.	.18
Goldfield Con.	1 7/16
Greene Cananea	30
Greenwater	.05½
Internat. S. & R.	‡115
Kerr Lake	3⅛
Keystone	‡1½
La Rose	1½
McKinley-Dar-Sa.	1 5/16
Min. Co. of A. new	2½
Nipissing Mines	8½
Ohio Copper	7/16
Pacific Sm. & M.	‡⅛
Puebla S. & R.	3
South Utah M&S.	.25
Stand'd Oil of N.J.	377
Stewart	1½
Tonopah	4½
Tonopah Ex.	1½
Tonopah Merger	.60
Tri-Bullion	⅛
Tularosa	1⅛
Union Mines	.04
United Cop., pfd.	3
Yukon Gold	2

LONDON Oct. 20

Name of Comp.	Clg.
Camp Bird	£0 16s 0d
El Oro	0 14 6
Esperanza	0 18 9
Mexico Mines	5 15 0
Oroville	0 6 6
Santa Gert'dis.	0 18 9
Stratton's	0 1 6
Tomboy	1 6 3

BOSTON EXCH Oct. 28

Name of Comp.	Clg.
Adventure	1½
Ahmeek	280
Alaska Gold M.	22½
Algomah	1½
Allouez	34
Am. Zinc	18
Ariz. Com., ctfs.	5½
Bonanza	.30
Boston & Corbin	.60
Butte & Balak	4½
Calumet & Ariz.	64
Calumet & Hecla	420
Centennial	13½
Cliff	1½
Copper Range	36½
Daly West	2
East Butte	11½
Franklin	3
Granby	72
Hancock	15
Hedley Gold	29½
Helvetia	.25
Indiana	3½
Island Cr'k, com.	46½
Island Cr'k, pfd.	83½
Isle Royale	18
Keweenaw	1½
Lake	8
La Salle	3½
Mass.	2
Michigan	‡1½
Mohawk	41
New Arcadian	1½
New Idria Quick.	2½
North Butte	24½
North Lake	1
Ojibway	.50
Old Dominion	50
Osceola	77½
Quincy	58
Shannon	6½
Shattuck-Ariz.	28
Superior	23
Superior & Bost.	2½
Tamarack	27
Trinity	4½
Tuolumne	.90
U. S. Smelting	38
U. S. Smelt'g, pf.	47
Utah Apex	2
Utah Con.	9½
Victoria	1½
Winona	1½
Wolverine	43
Wyandot	.50

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Name of Comp.	Bid
Bingham Mines	5½
Boston Ely	.47
Butte&Lon'nDev.	.30
Cactus	.02
Calaveras	1 5/16
Chief Cons.	1 5/16
Corbin	.66
Cortez	.20
Crown Reserve	1 11/16
Eagle & Blue Bell	.98
First Nat. Cop.	2½
Houghton Copper	3½
Majestic	.27
Mexican Metals	.46
Moneta Porc.	‡.07
Nevada-Douglas	1 1/16
New Baltic	.50
Oneco	.80
Raven Copper	.08½
Rhode Island Coal	.01
Smokey Dev.	.75
So. Lake	3½
S. W. Miami	‡1½
Tonopah Victor	.25
Trethewey	.30
United Verde Ext.	.50

‡Last Quotation.